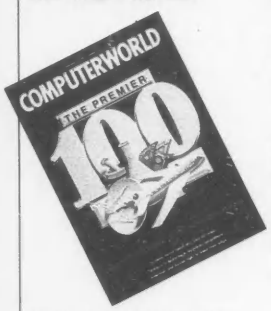
THE NEWSWEEKLY OF INFORMATION SYSTEMS MANAGEMENT
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COMPUTERWORLD

INSIDE



With this issue: The *Computerworld Premier 100* showcases the most effective users of information systems.

In Depth — The quest continues for the Holy Grail of interoperability. Page 87.

Bush's antidrug campaign bypasses new IS initiatives. Page 14.

Borland takes aim with its Quattro Pro at what it sees as 1-2-3 Achilles' heel. Page 6.

IRS to comb over bald spots in taxpayer telephone assistance with PC-based expert system. Page 37.

Fifteen-year-old SNA is trying to cut the apron strings in its attempt to become a mature, flexible communications system. Page 127.

When the byte is better than the bark: Purdue's School of Veterinary Medicine looks to use computers, not animals, in education. Page 41.

IBM rekindles AS/400 flame

Woos System/36 users with midrange models, smoother migration

BY ELLIS BOOKER
CW STAFF

WHITE PLAINS, N.Y. — IBM gave its Application System/400 a face-lift last week in hopes of rejuvenating sales to its enormous base of System/36 users.

The firm slipped its two new higher performance models of the AS/400 — the B35 and B45 — into a System/36 price category and unveiled a new version of the OS/400 operating system that early users said eases the migration from the System/36.

According to IBM, the B35 and B45 perform 22% and 14% faster than their respective predecessors, the B30 and B40. At the same time, it announced a free upgrade program for B30 and B40 users who sign up for the new processors before the end of the year and install them by the end of the first quarter of 1990.

The upgrade policy for the new AS/400s caught the eye of several users. "For us, it could be a zero-cost upgrade, and that's definitely interesting," said James Foster, who oversees a half-dozen AS/400s as manager of international information systems at Abbott International Ltd. in Chicago.

For Arizona Trust Co. in Tucson, Ariz., which took early delivery of an AS/400 B30 last year, the upgrade offer is "very attractive," according to DP manager Wayne Hall. Hall said he has been very satisfied with the AS/400 to date, adding that it is running System/34 applications that were "easily

Continued on page 128

LAN reliability worries nag corporate users

BY CHARLES VON SIMSON
CW STAFF

The Fortune 500's honeymoon with local-area networks appears to be coming to a close.

As networks gain credibility with corporate management, they are being implemented at an ever-accelerating rate. But with greater acceptance comes greater risk associated with failure. A study by Infonetics, Inc., a San Jose, Calif., market research firm, claims LAN downtime costs the average Fortune 500 firm nearly $3.5 million per year in lost productivity and $606,000 in lost revenue as networks sink with critical information aboard. Infonetics said the average network is down about 6% of the time, a number several users called realistic.

Infonetics acknowledged that a good amount of speculation was involved in the productivity figures. However, managers and other consultants found the numbers provocative, giving them cause to think more about LAN failures. In some cases, they said, the numbers even appear conservative.

IS managers who have been burned by failed systems contended that network management software has lagged behind the size and scope of networks and that system crashes involving critical data are becoming more frequent. While connected systems are clearly better than what has gone before, managers

Continued on page 12

General Signal's IS utility shatters decentralized mold

BY CLINTON WILDER
CW STAFF

NORTH WALES, Pa. — General Signal Corp. is not the first company to consolidate its information systems processing infrastructure. But the way it went about it has been far from the norm for such a decentralized firm.

General Signal, a diversified manufacturing firm with 28 autonomous units, had never centralized much of anything until March 1987, when it decided to create a central utility that sells IS services to its business units. While each subsidiary is still free to choose its own IS destiny, the General Signal Services utility has convinced most of them to sign on because of its economies of scale, additional CPU capacity and the elimination of data center operation worries.



General Signal's Gladyszewski

"We realized that you can run a decentralized firm but centralize some functions," said Stefan Gladyszewski, director of operations systems at the $1.7 billion General Signal, based in Stamford, Conn. "We survived the politics of central MIS by keeping 100% of the applications work at the unit level."

Gladyszewski, who is a hard-charging, shoot-from-the-hip IS

Continued on page 16

Wang cuts 1,000, with more likely

BY MARYFRAN JOHNSON
CW STAFF

LOWELL, Mass. — Wang Laboratories, Inc. quietly laid off at least 1,000 employees last week in the first sweep of an accelerated cost-cutting campaign, *Computerworld* has learned.

Hundreds of more layoffs are in store this week and next as the company revs up its restructuring plans and reduces its employee count. That number is expected to drop from 28,300 worldwide to 25,000 or lower by mid-1990, company spokesman Paul Henning said.

"We are clearly making substantive cuts. Tough steps are being taken," Henning said. "We are looking at slow growth now, and clearly, the cost structure of this firm needs some work."

Already under way

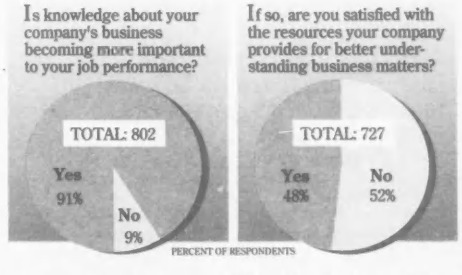
Henning said the cutbacks were in the works before Wang President Richard Miller took the helm three weeks ago. Last week's layoffs were apparently not ordered by Miller.

In its fiscal year ended June 30, Wang reduced its work force by more than 10%, or 3,200 employees. The company's net losses for the year came to $424 million, with $375 million from the last fiscal quarter alone.

Chris Christiansen, an analyst at the Meta Group, Inc. in

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They're satisfied, but . . .



Computerworld's *annual Job Satisfaction Survey finds IS professionals content, but they also share an array of concerns about their standing in their companies.* *See page 73.*

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Quotable

"In the old days of the 1970s, bringing on a new application practically meant a new network."

ROBIN LAYLAND
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On the evolution of Systems Network Architecture. See story page 127.

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UPDATE

Five years ago this month, a Diebold Research Services survey revealed that hardware spending as a percentage of IS budgets rose in 1984 — for the first time in a decade — to 29%, equal to the proportion spent on personnel. The report concluded that "an effort is being made to raise productivity through MIS."

Ten years ago, in an effort to land a multimillion-dollar DP system contract, IBM guaranteed 95% uptime to at least two Florida state government agencies, a departure from the company's standard 90% uptime pledge to the General Services Administration.



Choosing vendors on the basis of interoperability can be difficult. Page 87.

EXECUTIVE BRIEFING

■ **'Tell us more about the business,'** say IS professionals in *Computerworld's* third annual Job Satisfaction Survey. The survey finds that business knowledge is more and more important to IS professionals, but most of them aren't happy with their companies' efforts to educate them. While more than half say they're happy with their jobs, many complain that communication with top management is poor and job advancement potential inadequate. **Page 73.**

■ **Interoperability is supposed to make things simpler,** but it makes the job for IS a good deal more complex. Pressure from IS has created a move toward standards and bridges, but what has emerged is a hybrid technology that isn't the domain of any one vendor and which IS must learn to manage. Vendors and users alike have a new set of responsibilities in coming to grips with the interoperable world. **Page 87.**

■ **The LAN honeymoon is over** as corporations struggle with the reliability, data integrity and security problems posed by proliferating networks. Many users are grumbling that available network management systems and LAN applications are a long way from meeting mission-critical needs. One research firm estimates that the average big corporation loses $3.5 million a year to LAN downtime. **Page 1.**

■ **IBM reaches out to System/36 users** with new AS/400 models and a revamped operating system that users say eases migration from the System/36. The question is, will the kickers lend new vigor to slowing sales of the AS/400 line? **Page 1.** And just when you thought the System/36 was dead, IBM releases three new models in Europe, but under a different name. **Page 128.**

■ **Corporate decentralization doesn't always apply to IS.** General Signal pulled together its IS operations into a centralized utility that sells services to its distributed subsidiaries. It says the arrangement has saved money and increased accountability. **Page 1.**

■ **Wang quietly laid off 1,000 people last week** and publicly stated its intention to idle at least 2,000 more by year's end. Analysts say the cuts are overdue. **Page 1.**

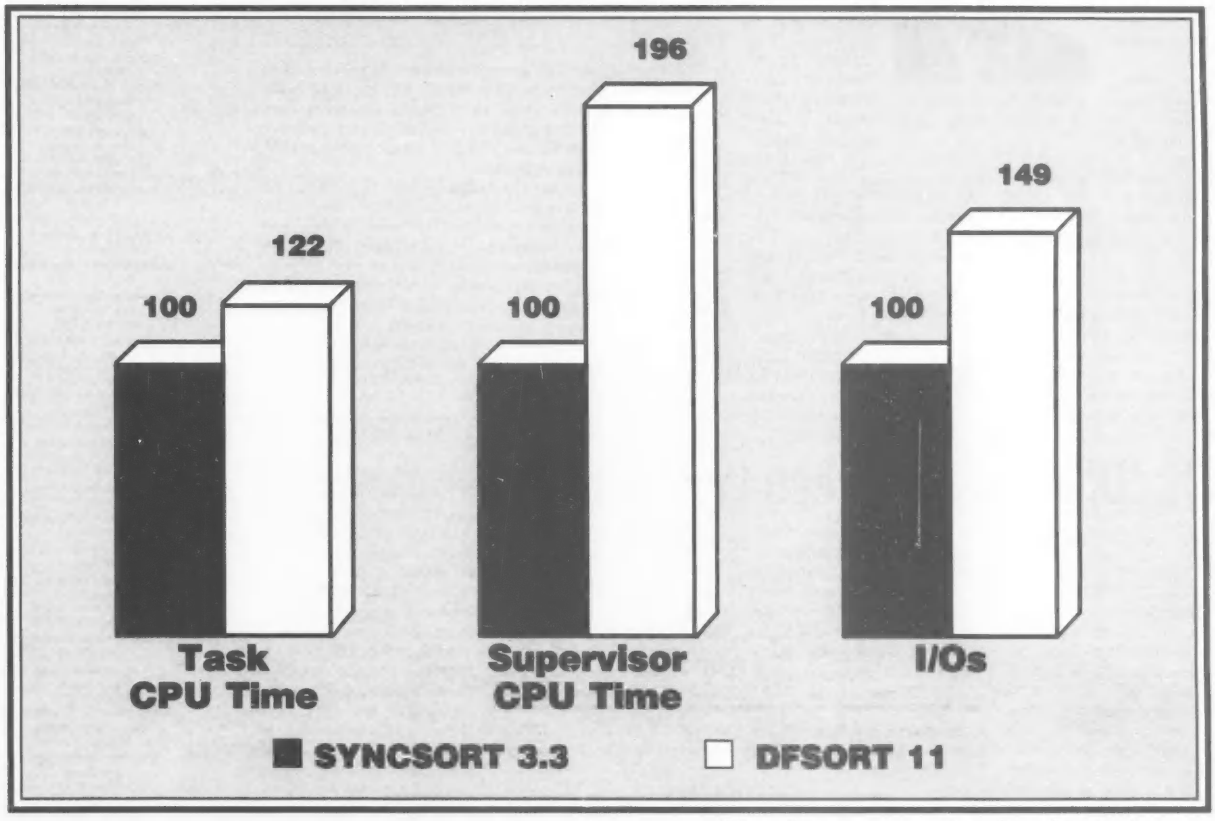
■ **As SNA turns 15,** it struggles to become a network architecture for the '90s. Users applaud IBM's ability to adapt SNA's one-host-per-user origins to a distributed environment, but SNA may reach drinking age before it becomes a true peer-to-peer system. **Page 127.**

■ **Have you considered a career in human resources?** There's an increasing need for human resources professionals to understand the needs, interests, motivations and culture of IS groups. This may present new career paths to IS professionals. **Page 106.**

■ **Training expenses can be justified** by measuring the costs of problems, such as errors in billing or inventory control, that are attributable to inadequate training. This justification method can help boost training commitments from organizations that are heavily focused on the bottom line. **Page 124.**

■ **On site this week:** Coors will use a packet-switching service to interconnect LANs around the company. **Page 59.** Swissair bucks the DB2 trend and opts for Cincom's Supra, citing IMS coexistence as a major factor. **Page 27.** A state-of-the-art supermarket prototype in Illinois shows just how much you can do with that bar-code data. **Page 25.** Purdue University makes strides in efforts to replace animal dissection with computer simulation. **Page 43.** A 4GL dethrones Cobol as Apple Computer's language of choice. **Page 25.** Computerization rocks the timber industry, bringing productivity improvements but long-term job displacement. **Page 130.**

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Communication is large part of Unruh's plan

BY ROBERT MORAN
CW STAFF

BLUE BELL, Pa. — Confronting the multifaceted challenge of trimming staff, dramatically reducing costs and responding to rumbles in Unisys Corp.'s user base, recently appointed President and Chief Operating Officer James A. Unruh sketched out the company's direction in an interview with *Computerworld* last week.



Unisys' Unruh *plans to share Unisys issues*

That strategy includes a "higher profile" for Unruh himself in placating the anxieties of employees regarding the state of the company and their fate if they are among the approximately 8% of staff that the company will trim.

Unruh also said that he will carry the Unisys message — including the role of open systems in "supplying solutions, not boxes" and the reasons for the company's financial performance — to key customers so that they can appreciate the issues.

"In my new role I will assume a higher profile, because I have to focus a lot of energies outward as well as address operating issues," Unruh said.

That message has been heard and believed by Gene Roman, president of Systems Design, Inc. in South Holland, Ill., and president of the Cube user group in Detroit. Roman said that his confidence in the company has risen as a result of discussions with Unisys executives. "I understand more of the details of their reasons," he said.

However, he faulted Unisys for its inventory crisis and said that the company had to take at least half the responsibility for what he deemed the sour U.S. market. "Unisys' U.S. marketing restructuring turned a soft U.S. market into a sour U.S. market," Roman said.

By the end of 1990, Unisys will attempt to improve gross margins by reducing costs by $400 million — through reductions in administrative staff and the lowering of manufacturing costs. The strategy will bear fruit by fourth quarter of this year, he said, "but the full impact will become apparent in 1990."

Roman explained that work force restructuring will bring more depth to the support staff and mirror the structure used by Unisys' highly profitable African division. "The user community will get better support," Roman said.

Unisys has finished wrestling with corporate problems spurred by the merger between Sperry Corp. and Burroughs Corp. and has addressed the absence of a midrange product with its Unix-based open systems line and the new 2200 series of processors, Unruh said: "The strategy is now to improve financial performance and to push aggressively in businesses that apply to [the firm's] major thrust in the open systems market."

An example of that is Unisys' recent formation of the Corporate Office for Imaging Systems, which will build complex imaging systems from several vendors on its opens systems platform (see story page 99).

FAA opts for Ada

BY J. A. SAVAGE
CW STAFF

The controversial programming language Ada will be used for the Federal Aviation Administration's 13-year, $3.6 billion plan to modernize its computing equipment. Last week, Computer Sciences Corp. signed a $134 million contract to develop applications in Ada for the FAA as a subcontractor to IBM, which holds the primary contract.

Earlier this year, the U.S. General Accounting Office, Congress' investigative arm, reported that after nine years, there is no evidence that the use of Ada is containing runaway government software development costs [CW, April 17]. The Department of Defense has adopted Ada as a standard language for much of its development in order to cut through the morass of software being developed in about 300 different languages.

Computer Sciences has been developing software for the FAA for the past 16 years, according to the company. While it will maintain existing software, it will write new applications in Ada for the modernized systems.

SQL/DS: Torn between two worlds

BY STANLEY GIBSON
CW STAFF

IBM's SQL/DS, the sometimes-overlooked little brother of DB2, is facing a future with a dual identity: one incarnation under the VSE operating system and another under VM.

The VSE version will probably be less functional than the VM version, which will be fully Systems Application Architecture (SAA)-compliant and will grow to resemble DB2 more closely, according to IBM. Currently, queries written under SAA SQL guidelines can access both DB2 and SQL/DS under VM but not SQL/DS under VSE. In the future, DB2 and SQL/DS under VM will share the following SAA attributes, according to Russ Donovan, IBM database market support manager:

- The same locking protocol. Row-level locking will probably replace DB2's page-level locking. SQL/DS now has row-level locking.
- The same referential integrity support. Current versions differ for cascade deletes.
- The same two-phase commit protocol for distributed transactions, called SAA coordinated commit.

IBM recently renewed its emphasis on VSE and is now aggressively trying to convert users in competing environments to SQL/DS under VM and VSE, despite the fact that VSE is not part of SAA. Users who wish to keep SQL/DS under both VSE and VM may face diverging versions with increasingly dissimilar functionality.

"It would be nice to bridge that gap," said Jerry Bruce, database administrator at Seven-Up/Royal Crown of Southern California in Los Angeles, which has both VSE and VM versions of SQL/DS.

Not all users share Bruce's concern. Many run limited SQL/DS applications on small IBM mainframes and are not worried about SAA connectivity.

Those who are can move VSE SQL/DS databases to VM SQL/DS to gain full SAA under VSE Guest sharing, Donovan said.

Many are using SQL/DS to support on-line queries for generating reports or for executive information systems. The interactive characteristics of VM favor it for these roles but are a disadvantage when it comes to large databases with high transaction volumes.

"The transaction rate is a lot lower with SQL/DS than it is with DB2 because of VM," said Howard Fosdick, a database consultant in Chicago.

One major difference between VM and VSE versions of SQL/DS that will become pronounced in the coming years will be in the area of distributed databases. While IBM has promised to eventually deliver fully distributed capabilities across all SAA databases, it has no plans to bring the features to the VSE version of SQL/DS. There is no technical obstacle to offering those capabilities, and user demand could spur IBM to offer them, the IBM spokesman said.

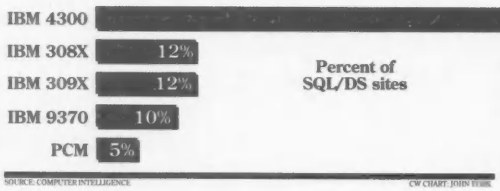
"The really interactive stuff will come when we announce OS/2 to SQL/DS, OS/400 to SQL/DS and DB2 to SQL/DS connectivity," Donovan said. Those capabilities are planned only for the VM version of SQL/DS.

Steven Rose, director of information services at United Way of America in Alexandria, Va., said he currently uses an AS/400 to gather data, which is then moved to an IBM mainframe running SQL/DS in order to generate reports. Being able to update both databases at the same time would be a plus, Rose said.

SQL/DS has been eclipsed by DB2's prominence in the past few years, despite the fact that there are more SQL/DS licenses — roughly 6,000 — compared with about 4,000 DB2 licenses.

Low-end concentration

IBM's 4300 series is the dominant platform for SQL/DS according to market research projections



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Borland rolls out Quattro Pro

Firm hopes spreadsheet's consolidated features lure Lotus' 1-2-3 users

BY JEAN S. BOZMAN
CW STAFF

SCOTTS VALLEY, Calif.— Borland International says it has a powerful new weapon in its David-and-Goliath battle against dominant Lotus Development Corp. in the personal computer spreadsheet arena. Borland claims its Quattro Pro spreadsheet, which debuted last week, can do much more than Lotus' 1-2-3 Release 3.0 — and without a memory upgrade.

Borland said Quattro Pro rolls desktop publishing, spreadsheet consolidation and an icon-driven interface into a single package that will prove attractive to long-time 1-2-3 users.

Unlike 1-2-3 Release 3.0, however, Quattro Pro can be used on Intel Corp. 8088-based PCs with at least 512K bytes of main memory, according to Borland. In contrast, Lotus recommends that Release 3.0 users have an Intel 80286 system with at least 1M byte of memory. Lotus has also released the less feature-laden 1-2-3 Release 2.2 for 8088-based PCs.

Quattro Pro has been tested for the past few months at 400 corporate sites, including Pan American World Airways, Intel and Black & Decker Corp. The $495 Quattro Pro spreadsheet package supersedes the 2-year-old Quattro, which Borland will continue to sell at a reduced price of $129.95.



Quattro Pro can operate *without a memory upgrade*

Quattro Pro combines standard spreadsheet capabilities with an object-oriented icon presentation and an underlying report-writer and graphics package. Borland said it has keystroke-level compatibility with 1-2-3 Version 2.01. It also can import data from Borland's Paradox relational database management system and Ashton-Tate Corp.'s Dbase products.

Borland executives compared their all-in-one package to the two 1-2-3 versions, Release 2.2 and Release 3.0. They noted that 1-2-3 Release 2.2 had been optimized for desktop publishing, while 1-2-3 Release 3.0 was optimized for multiple-spreadsheet consolidation.

"Our customers have told us there is a dilemma in corporate America about choosing spreadsheets," said Borland Chief Executive Officer Philippe Kahn.

Lotus countered that Kahn's statements are unfair because they imply, among other things, that 1-2-3 Release 3.0 has little or no graphics or desktop-publishing support.

"We are offering people a choice of spreadsheets," said Lotus spokes-woman Susan Earabino. "We're not forcing them to choose one over the other." She described Release 3.0 as a superset of Release 2.2 but said that 3.0 lacked the Allways what-you-see-is-what-you-get report-writing program now in Release 2.2.

Inching into the market

Borland, which holds less than a 5% spreadsheet market share, may make some headway with the new product. One Quattro Pro beta-test site user, Bob Deering, at Los Angeles insurance brokerage firm Johnson and Higgins, said he will recommend Quattro Pro to department managers buying new software. He has used the new package for several months.

"Lotus' 1-2-3 has been our standard," said Deering, who tests new software for use by 500 employees on the firm's 250 PCs. "We're not going to go out and buy 200 new copies of Quattro Pro, but we're going to recommend it for users who need file-linking and graphics capabilities."

Some industry analysts questioned whether superior features alone would cut into Lotus' dominant market share. "Are they going to make big dents in the Lotus marketplace?" asked Jon Yarmis, a PC program director at Gartner Group, Inc. in Stamford, Conn. "Not likely, or at any rate, not soon. The big opportunities to gain market share will come when people in large corporations start evaluating whether to switch to IBM's OS/2 operating system."

Borland tackled the complexity of supporting Quattro Pro's girth within the MS-DOS operating system's 640K-byte memory limit by using a proprietary technology. The company's Virtual Real-Time Object-Oriented Memory Manager (VROOM) can dynamically re-allocate spreadsheet "objects" within the 640K bytes of random-access memory and move them to add-on memory boards, system cache memory and system hard disks.

VROOM, which appeared in Borland's Reflex 2.0 earlier this year, has been expanded under Quattro Pro, the company said. Recalculation of spreadsheets, as well as system housekeeping, happens in the background.

LAN Manager users looking to the future

BY PATRICIA KEEFE
CW STAFF

The bold, the brave and the few who have taken OS/2 LAN Manager-based file servers for a test drive typically did so with standards and multitasking on the brain. With OS/2 looming on the horizon, many corporations are piecing together strategic architectures that will emphasize speed and flexibility while reflecting the need to contain costs.

LAN Manager is a definite step in the right direction, users polled last week agreed. International Data Corp., a market research firm based in Framingham, Mass., has predicted that by year's end, LAN Manager will have a 5% market share (about 200,000 nodes), jumping to 13% in 1990 and skyrocketing to 31% by 1993. LAN Manager was co-developed by Microsoft Corp. and 3Com Corp. It first shipped a year ago.

Many users say they are looking for a "unifying technology." They want to reel in unruly diversified environments as much as possible under one operating system — most likely OS/2.

"The main reason we chose LAN Manager is that someday we'll need to do OS/2 on a relatively major scale," said an office automation project leader at a large industrial gas supplier.

"Architecturally, we have enough problems working with the operating systems we do have — DOS, OS/2 and Unix — and to add [a proprietary network operating system] just confuses the matter," added a consultant for a major Wall Street brokerage that appears to be pulling away from a large investment in Novell, Inc.'s Netware in favor of LAN Manager.

A standards approach was key for most users surveyed, including Canadian Airlines and the Chicago law firm of Freeborn & Peters, where LAN Manager's support for the SQL Server was crucial.

OS/2 Server users have mostly either given the nod to 3Com's 3+Open LAN Manager-based server or said they are leaning heavily in that direction. High visibility, low overhead and a wealth of added services, such as mail and gateways, have helped 3Com clinch sales.

3Com's chief competitor is IBM's OS/2 LAN Server — also LAN Manager-based. But users who evaluated IBM's offering said acceptance is hampered by IBM's requirement for the expensive, memory-hogging OS/2 Extended Edition. The latter's base sticker price of $830 per client, plus the added cost for up to 8M bytes of memory, has left many gagging.

"Extended Edition is too much expense and requires too much memory to upgrade [65] stations at once," said Leeland Hutchinson, a partner with Freeborn & Peters, an IBM shop that also needs a gradual growth path for its DOS workstations.

No Named Pipes support

Compatibility is another issue. One user complained that OS/2 Extended does not support LAN Manager's Named Pipes application programming interface on a DOS client. This creates a problem for users who want SQL database access, said Richard Smithers, information systems project manager for Canadian Airlines in Vancouver, B.C.

Actually, Named Pipes' peer-to-peer connectivity is a major selling point. "It's like telephone communications," said Nader Rahimizad, a systems engineer at Gaard Automation in Portland, Ore., a developer of robotic systems for manufacturing. He explained that LAN Manager's nondedicated, multitasking approach, combined with Named Pipes, allows the server to establish concurrent, direct communications with multiple nodes.

"An OS/2 server allows you, for example, to attach a bunch of printers on a secretary's workstation, and she'll never notice the speed degradation. You couldn't do this with Netware," added the brokerage consultant.

3+Open also offers an extra 100K bytes of available memory for applications, Smithers said. LAN Manager 1.01 features even tighter code, freeing up to 60K bytes of extra memory.

Besides memory costs and constraints, a generic LAN Manager advantage lies in downsizing. Multitasking and peer-to-peer communications have enticed developers to port to OS/2 packages previously requiring a host system, thereby cutting their own development costs and saving customers money.

For example, Gaard Automation believes it can efficiently automate an entire plant using a LAN Manager network. "Before, you had to buy a mainframe; now we can get everything done with a fairly low-cost [solution]," Rahimizad said.

Migration of major desktop applications to a networked environment is another LAN Manager advantage. Many business applications have been or will be ported to OS/2. Users also cited improved throughput. LAN Manager sends only the data requested instead of the entire file, cutting back on network traffic. Access to Presentation Manager also aids ease of use.

Merger talks extended

CHICAGO — Arthur Andersen & Co. and Price Waterhouse completed two months of merger talks last week — only to say they will keep on talking.

In a short joint statement released last week, the firms said the discussions had been "beneficial" and would continue "until all pertinent issues have been thoroughly explored and definitive conclusions reached." No time frame was put on the extension of the talks.

If combined, the two would create the largest accounting and information systems consulting firm in the world, valued at about $5 billion in annual revenue. Yet from the start, observers pointed to differences in the two companies — for example, Andersen's bustling consulting business contributes 40% of its revenue, compared with Price's 18% — that would make a merger difficult to pull off.

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NEWS SHORTS

Shake up at Dataproducts

A massive restructuring at Dataproducts Corp. will carve the company into three decentralized divisions, move most printer manufacturing operations offshore and eliminate 400 jobs in the U.S., the printer vendor said last week. Aimed at cost cuts in the multimillion-dollar range, the overhaul may also involve selling the company's Woodland Hills, Calif., real estate and its Dataproducts New England subsidiary, discontinuing certain printer lines and revising executive pay levels.

Two more Tariff 12 enrollees

Paine Webber, Inc. and Kemper Financial Companies, Inc. became the latest companies to climb aboard AT&T's controversial Tariff 12 telecommunications service last week, each signing contracts for $50 million over a 5-year term. AT&T treated the contracts as a coup over MCI Communications Corp., which has lately been boasting about its major deals stealing business away from AT&T.

DG and HP users hear from Oracle

Oracle Corp. boosted its support of proprietary platforms last week with the introduction of new and enhanced products for Data General's AOS/VS-based systems and Hewlett-Packard's HP 3000 line. The Belmont, Calif.-based firm announced that the Oracle DBMS Version 6.0 with transaction processing option, SQL Net Transmission Control Protocol/Internet Protocol networking software and Oracle Financials are available for the DG platform. Similarly, the firm said SQL Net and four Oracle Financials are now being offered for the MPE XL-based HP 3000.

Operating system up next

Next, Inc. has finished the first version of its operating system software and plans to begin shipping it Sept. 18, a spokesman for the company said last week. Because Next plans to rely heavily on sales to universities, it needed to complete Version 1.0 around the time students and faculty traditionally return to the classroom. Only a test version of the package has been available since spring. Many early users have decided to wait for the full-blown version.

Intel pairs with Micro Focus

Intel Corp. and Micro Focus, Inc. said last week that they will work together to make Cobol compilers and development tools for Intel microprocessors. The two will also cooperate in the design phase of future Intel microprocessors to enhance their capabilities for Cobol. Intel purchased 1.6% of Micro Focus' stock in June.

Investigation at Livermore Lab

A Congressional subcommittee and the Energy Department's inspector general are investigating the transfer of a laser technology license from the University of California Lawrence Livermore National Laboratory to a budding supercomputer company set up by former lab scientists. Representative John Dingell (D-Mich.) said the award to start up N-Chip had "the appearance of a conflict of interest." A laboratory spokesman said, however, that no other company had expressed interest in the license for the technology known as laser pantography, although it had been available for years.

Vendor eyes two worlds

Presentation Manager or X Windows? That is the choice many users and software developers are struggling with. But Visionware Limited, a developer based in Leeds, England, has set out to bridge the two worlds. The organization announced last week that it is developing an X Window System server for OS/2, to be available early next year. The OS/2 X server will allow OS/2 users to use applications developed for X Windows and to display applications running concurrently in both environments.

Networld: Calm before the storm

BY CHARLES VON SIMSON
CW STAFF

Managers who are headed to Networld in Dallas this week looking for new products and bold new directions might do better to save the plane fare and take a few programmers to lunch. Major vendors are using the show not to demonstrate significant new products but to begin jockeying for position as the local-area network market braces for change early in the 1990s.

While the market for LANs has been dominated for several years by DOS-based products from Novell, Inc. and 3Com Corp., analysts see major vendors making strategic bets on new technologies and taking every opportunity to tell users about their approach.

"The show will be a quiet spot before the beginning of a storm," said Steve Wendler, networking analyst at Gartner Group, Inc. "The large vendors are digging in for a battle over [reduced instruction set computing] and OS/2 networks. They are trying to escalate the perceived needs of users and expand the margins in the market."

Wendler and others see the battle lines being drawn as Digital Equipment Corp., IBM and others try to wean users away from DOS file-sharing networks and toward cooperative processing based on Unix and OS/2. Corporations remain reluctant, given the costs and risks, but vendors know that the long lead time on such sales means that getting the message across today is critical.

Typical of the marketing pitches will be Oracle Corp.'s announcement of a network products division. The new business unit will operate as a separate marketing entity for the company's client/server-based systems, becoming the latest in a series of efforts by database developers to marry their products to the growing LAN market.

Although empty of new products or true insights into the company's long-term strategy, Oracle's announcement will be among the most substantive of the show, which reportedly will be long on "big picture" hype and short on deliverable products from major vendors.

As an example of the emphasis on shifting technology, DEC will attempt to turn up the heat under its Unix-based desktop networking products. DEC reportedly will present its personal computer network using an elaborate stage show. However, as the show's script was being assembled last week, sources close to the company were not optimistic that DEC will have a new product to demonstrate.

A number of other announcements are expected.

- Novell is expected to announce marketing agreements with Sun Microsystems, Inc. and Nantucket, Inc.
- AT&T is expected to announce enhancements for its network operating system, and Gupta Technology is expected to demonstrate a product that will allow Lotus Development Corp. 1-2-3 users to access its SQLbase and IBM's DB2.
- Wollongong Group, Inc. is expected to announce Pathway, which represents its move into the Transmission Control Protocol/Internet Protocol-based integration of desktop systems with larger systems.

IBM to enter mixed platform environments

BY PATRICIA KEEFE
CW STAFF

RESEARCH TRIANGLE PARK, N.C. — Recognizing that the office has become a "melting pot," IBM told attendees at a recent briefing here that its network offerings will shortly take a leap forward in the area of heterogeneous connectivity, faster speeds and resource sharing of system-based devices, data and applications.

Networked users chafing at the bit of IBM's traditional reluctance to acknowledge or support other vendors' proprietary products or non-IBM-sanctioned standards — such as Ethernet or Unix — can expect some relief "relatively soon," IBM officials promised. In fact, users can expect the pace of change to pick up significantly, particularly in networking.

Spurred on by user pressure, and perhaps market realities, IBM has shown evidence in the past year of a more open approach to mixed environments. For example, the vendor has broken the mold with plans to support Open Systems Interconnect standards such as X.400 and earlier this year shipped products connecting Token-Ring to Ethernet.

Moreover, IBM officials have backed away from previous strong statements regarding the unsuitability of ordinary telephone wire — unshielded twisted pair — for 16M bit/sec. Token-Ring networks. Users are moving en masse to this inexpensive wire, and their protests have spurred two other Token-Ring suppliers -- Proteon, Inc. and Ungermann-Bass, Inc. — to announce plans to deliver 16M bit/sec. support over unshielded twisted pair.

At the briefing, IBM said it was willing to consider technological advances that could overcome attentuation and interference problems related to running the high-speed network on the low-grade cable.

Users can also expect IBM to acquiesce to the realities of a mixed environment via multivendor direct host attachment, as well as bridges to and management of different kinds of LANs. The OS/2 Extended Edition SNA Gateway, slated for release in November, will support both OS/2 and DOS clients, as well as Ethernet and Token-Ring utilizing Netbios, LU6/2 and 3270 emulation modes.

The computer giant has already taken strides to improve compatibility between its OS/2 LAN Server and Microsoft Corp.'s OS/2 LAN Manager. However, Michael O'Dell, LAN Server product manager at IBM's Austin, Texas-based Distributed Systems Division, noted that since the application programming interfaces are already embedded in LAN Server, the issue centers around what IBM chooses to support. For example, IBM prefers Presentation Manager's print spooler; Microsoft does not.

Backbone speed will rocket to 100M bit/sec. via a Fiber Distributed Data Interface (FDDI) offering expected later this year that will support voice and data. Ellen Hancock, an IBM vice-president, has said repeatedly that IBM will announce an FDDI product before year's end.

IBM does not see FDDI as an immediate replacement for 16M bit/sec. speed. Even though users have said they are satisfied with 4M bit/sec. speeds, IBM boasted that "customers are jumping at 16M bit/sec. speed," citing pricing, memory enhancements and the capability to upgrade the network.

IBM added it has passed the million mark in sales of its Token-Ring adapter cards, which since November have included a 4M/16M bit/sec. board priced roughly $100 over its original 4M bit/sec. card. That card enables user to migrate to 16M bit/sec. speed at the flick of a switch. IBM's network management strategy will be augmented with configuration, change, performance and accounting management. A key element is the ability to manage multiple LANs.

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Vendors stick with plans for fourth-quarter I486 debuts

BY MICHAEL ALEXANDER
CW STAFF

Several personal computer vendors are gearing up to ship products in the fourth quarter based on Intel Corp.'s I486 microprocessor, despite reports that the speedy new chip is flawed and a bit behind schedule.

Beta tests of the I486 have indicated that there is "functionally no problem in the design of the chip running Unix but there are a few things that need to be fixed," said T. V. Krishnamurthy, general manager of DCM Data Products, a subsidiary of DCM Ltd. of India and a beta-test site for the I486.

Krishnamurthy said the company is already selling upgrade boards with sample I486 chips in India and intends to start selling the boards in the U.S. next month. The company will initially receive 50 to 100 chips in October, and regular supplies of chips will start after February, he said. Pricing for the boards has not been set.

AST Research, Inc., another I486 beta tester, will have two upgrade boards — the Fastboard 486/25 for AST's Premium 386/33, priced at $2,995, and Premium 368/25MH, priced at $3,695 — in late October, according to Michael Krieger, senior manager of advanced technologies. "We're right on track for the quantities that we were expecting," Krieger said.

The company's testing of the one-million-transistor chip "has come up pretty darn clean," he said. "The problems have been trivial."

Hewlett-Packard Co. and Dell Computer Corp. will also have products based on the I486 chip on the market before year's end, according to spokesmen for the two firms.

Most PC vendors, including IBM (among the first to announce plans to introduce a 486 upgrade board), plan to ship 486-based products in the first quarter of 1990.

Intel said that the chip will be available in production quantities as planned, despite reports that the scheduled introduction has already slipped three or four weeks from September to October.

"We will ship in the fourth quarter, but we are not being specific as to when in the quarter," said Ursula Herrick, a spokeswoman for Intel. "We told some customers that we would give them parts in September, but we have been testing the chip and have found some errata we are going to correct. It is going to take a bit longer to do that. We can't be as aggressive in ramping up for the chip as we first thought, but we are on track."

Kimball Brown, an analyst at Prudential-Bache Securities Co., predicted that Compaq Computer Corp. will introduce three I486-based machines in late October: a single-user model with an AT bus; a server-workstation with an Extended Industry Standard Architecture (EISA) bus; and a high-performance server-workstation with dual I486s. The workstation-servers will be priced at about $20,000 for the EISA version and $40,000 to $50,000 for a fully configured dual I486 version.

Compaq declined to comment on whether the company will introduce any I486-based products this year. "Intel gave the fourth-quarter target date, but we were not comfortable committing to it like IBM," a spokeswoman said.

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HP rolls out mini, Apollo workstation

BY J. A. SAVAGE
CW STAFF

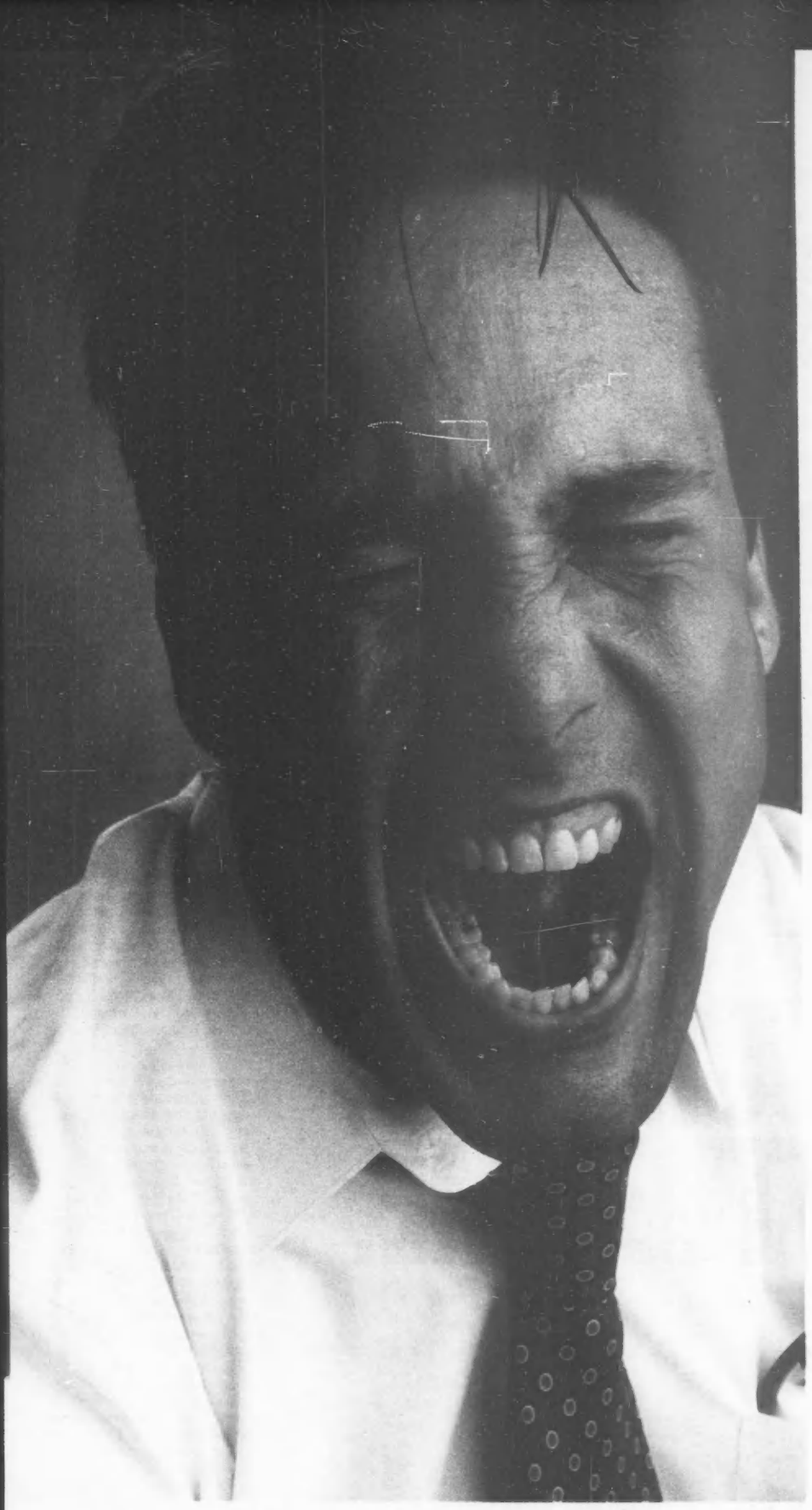
SAN FRANCISCO — Hewlett-Packard Co. plans to introduce the high end of its HP 3000 commercial minicomputer and at least two new workstation families from its Apollo subsidiary tomorrow.

Using Interex, the HP international user meeting, as a backdrop, the company will unveil a 28 million instructions per second (MIPS) computer — HP counts two of its reduced instruction set computing MIPS for one IBM MIPS —with a 50% performance improvement in an SQL-based environment, according to Willem Roelandts, vice-president and general manager of the company's Computer Systems Group.

"Now, we think we can tune it to within 20% [performance] of a flat [file] database," he said.

The former high-end machine in the series is the Model 955 for 400-plus users at $385,000. No other details of the new system were available.

Also to be introduced tomorrow are two families of Apollo workstations, at the entry level and high end of its desktop graphics lines. The workstations are not likely to incorporate much, if any, HP technology, as they were under way before HP acquired Apollo, according to a spokesman.



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LAN worries

FROM PAGE 1

are casting a much more skeptical eye on the true benefits of the network.

"We still don't fully understand the problems of network management," said a senior systems manager at Arco Oil & Gas Co., based in Dallas. "We have no system in place to quickly determine even where the problem is when the network fails."

"On top of that, networks that were not seen as being critical when they were installed two years ago have become critical, and we have been slow to respond to that change," said the manager, who asked not to be named. "At the same time, the ante has been upped. When the network running orders for our crude oil group goes down for five minutes, it means a hell of a lot of money to the company."

The gap between the value of technology to a company's business and the ability to manage it effectively continues to spread, and only advances by software developers will allow users to cross it.

"In the last year, companies have stopped using LANs just to share printers and have built critical applications directed at customers," said Michael Packer, vice-president of the MAC Group, a Cambridge, Mass.-based management consultancy. "But the increased complexity in architectures has not been matched by vendors, and in many cases, users have been left in the lurch."

Packer explained that until recently, most personal computer database products were missing the functionality that was rudimentary in mainframe operating systems. Transaction backout recovery capabilities — software routines that control a transaction if it fails in midcycle — have been absent in PC systems and have caused many problems.

In addition, most users have gone from simple file sharing to "applications running on windows over DOS and gateways and routers," Packer said.

"Users' problems are a simple case of network systems software code catching up with the hardware. It hasn't happened yet," he said.

The problems are often not obvious. At the Silicon Valley development lab of a major software house, a 3Com Corp. LAN that was originally designed for five users was grown out to an 80-node network with minimal adjustments to the network operating system. The stretched network crashed a few times per week at one point, leaving programmers idle. The failures cost the company at least $10,000 per day in lost wages, even if the system was only down for a few hours. Adding hardware failed to solve the problem, which eventually required basic software and cabling adjustments.

Brave new world

There has also been a lack of organizational response to the new demands created by networked systems. "Some companies have solid management in place, and some new technology would help them," said Mary Modahl, a network analyst at Forrester Research, Inc., also based in Cambridge.

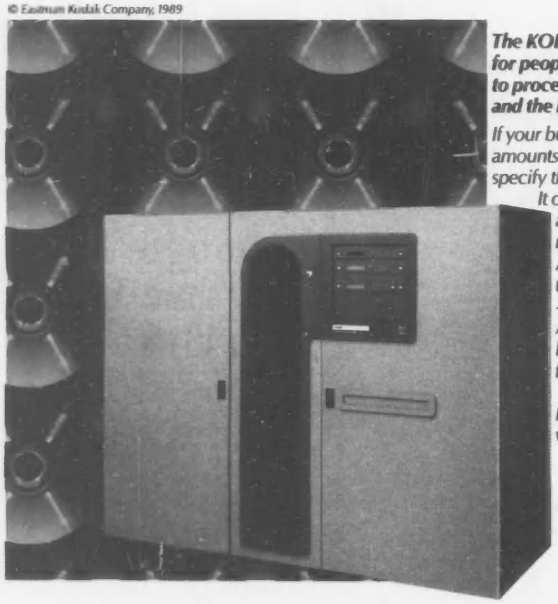
"Many companies have piles of technology, but the management has no understanding of even basic network issues. They are frozen in place, and the result is that a lot of companies are in over their heads," she added.

Infonetics will release the final results at Networld in Dallas this week. The company's figures take into consideration such factors as employees' salaries and how much time they spent on the network in calculating the value of lost productivity.

"Lost productivity is just an opportunity you are missing," said Keith Louvrien, PC technical analyst at Cenex/Land O' Lakes, a farm cooperative headquartered in St. Paul, Minn. "I don't think our experience has been anything like [a $3.5 million loss], but I suppose it depends on how you do the equation."

To Modahl and others, the $3.5 million estimate seems low. "Productivity is not only lost when the system crashes," Modahl said. "Even badly managed, slow networks cost companies a fortune without their even knowing it."

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IS effort slighted by drug plan

Bush's $7.9B budget precludes growth of information-sharing projects

BY ELISABETH HORWITT
CW STAFF

WASHINGTON, D.C. — In parceling out $7.9 billion for anti-drug efforts last week, President Bush just said no to any major new information systems projects to keep drugs from crossing the border. This could put a serious damper on information resource departments' recent efforts to coordinate sharing of information among various agencies so that border and coastal agents get the information they need.

The antidrug spending proposal outlined by Bush will have little effect on existing projects, either finished or close to completion, that have focused primarily on networking and access tools to allow various federal agencies to share their drug enforcement databases more effectively.

The U.S. Customs Service, for example, is finishing up implementation of a high-speed packet-switched network that is designed to provide faster access to its data centers for agents within Customs and other drug enforcement arms of the government [CW, Feb. 27].

Customs has also recently developed a "friendlier interface" that makes it easier for agents to obtain the data they need in a timely fashion, said R. Gary Cantrell, director of the operations division of Customs' Office of Data Systems. "What we're doing is totally separate [from Bush's program]," he added.

However, Customs' IS group could still use some funding, primarily for continuing efforts to make the system more widespread, Cantrell said. As more agencies join its Consolidated Data Network and more users access its data centers regularly, Customs will have to add more high-speed lines and probably more IBM mainframes. Also, Customs is still waiting for word on funding it hopes to receive from bills that have recently gone through Congress, Cantrell said.

The Federal Bureau of Investigation and the U.S. Drug Enforcement Administration have also initiated an effort — dubbed Tiger Paw — to provide various government organizations with easier access to various government databases through the DEA's El Paso Information Center (see story below). However, the expert systems to help agents make decisions, which were at the heart of the project's original goal, have been put on hold because of earlier funding cuts, said Carolyn Morris, deputy assistant director of development at the FBI's technical services division. "AI would provide real far-reaching benefits. It's in the DEA's hands now, and I think it will be resurrected at some time, but it's a matter of funding," Morris said.



AP/WIDE WORLD

Special agents *Michael Bergmen (left) and Doug Gow with seized heroin*

The U.S. Coast Guard is also in a position to reap benefits from IS projects that were initiated in the last few years, "with at least enough funding to start the ball rolling in most areas," said Lt. William Dyson at Coast Guard headquarters.

The Coast Guard's information resources group has been focusing on improving the "historical system" that keeps an eye on actions taken in maritime areas, providing such information as where and when a certain vessel has been seen before, whether it has been boarded and whether violations were found, Dyson said.

More recently, funding efforts have been directed at shifting the emphasis from historical to tactically oriented data — which primarily means delivering timely information to Coast Guard units and providing them with an easy-to-use interface, Dyson said. Right now, "it takes a computer jock" to access the organization's Operations Computer Center, so most shipboard personnel have to put their queries verbally to a terminal operator on land, who then conveys the request to the center, he said. This can add confusion, as well as a potentially dangerous time lag, particularly "when you're bobbing around in a patrol boat, beside a 200-foot freighter, 100 miles from everywhere, and you have to ask a difficult question to the system," Dyson said.

The Coast Guard is also in the planning stages of a project that includes developing a request for congressional funding to develop a more user-friendly interface and system upgrades. That should dramatically increase the computer center's effectiveness, Dyson said.

The Coast Guard has also been part of a "widespread effort among federal agencies to tie systems together and provide more access for people with a need to know," Dyson said. For example, it worked with Customs on the Command, Control, Communications and Intelligence (C^3I) project to install information centers in Miami and Southern California to counter smuggling by aircraft.

The most recent candidate for sharing information with C^3I is the Defense Department, which has been "designated the lead agency for tracking suspect aircraft," Dyson said. "They can't arrest anyone, but they have lots of detection and tracking resources."

In a way, budget constraints may have accelerated the Coast Guard's efforts to access its own IS resources and those of other agencies more effectively, Dyson said, "since we have to make the best use of the available technology we can afford."

Tiger Paw empowers DEA

Coast Guard agents eyeing a ship heading toward no particular port want to know how likely it is that the vessel has cocaine or refugees in its hold. Customs agents on the Texas border want to know ahead of time whether the man driving into their station is likely to open fire when they open his trunk.

A project dubbed Tiger Paw has already increased the effectiveness of drug agents in a variety of federal organizations by providing them with faster, easier access to the data they need to make timely decisions. But the project's original aim, which was to develop expert systems to help agents make more effective, timely decisions based on that data, has been put on hold because of lack of funds, government spokesmen said.

The DEA and the FBI initiated Tiger Paw in 1986, at a time when the two agencies expected to merge, said Carolyn Morris, deputy assistant director of development in the FBI's technical services division. The project's original goal was to "use expert system technology to get a better handle on strategic analysis of interdictive-type information [in order to] make recommendations on courses of action," Morris said. The technology was to be implemented at the DEA's El Paso Information Center (or EPIC, now in Fort Bliss, Texas), which acts as a liaison between agents and information in federal agencies' databases.

"AI would have provided some real far-reaching benefits [through] strategic analysis of interdiction information," Morris said. Using rules of thumb gathered from human analysts, the system would have been able to interpret data in order to recommend the best course of action, she added.

The DEA and FBI hired the Institute for Defense Analysis (IDA), a nonprofit think tank within the Department of Defense, "to do all the AI work," Morris said. But the institute recommended first addressing the "watch" side of EPIC, which provides the actual data.

This initial phase of Tiger Paw, which includes such major steps as standardizing database access on an HP Apollo division workstation and a consistent query system, has already benefited the law enforcement community in several ways, Morris said. First, it has reduced the time it takes to process queries. Second, it has enabled agents to "avoid missed interdiction opportunities" by providing consistent investigative techniques for different problems, as well as by implementing more effective technology, such as a mapping-triangulation system to intercept aircraft. Third, it has improved data integrity through automatic updates as information is processed.

The DEA expects to realize a $355 million benefit over the systems life cycle from 1986 to 1994, based on a projection of additional assets seized because of Tiger Paw, Morris said. So the time, as well as the $50,000 spent on 12 Apollo workstations and the $3.5 million paid to the IDA for software, "was well spent."

The expert systems phase of Tiger Paw was put on hold earlier this year because of budget cutbacks, Morris said. "I think the system will be resurrected, but I'm not sure who will do it."

ELISABETH HORWITT

Cullinet cedes autonomy for stability within CA

BY NELL MARGOLIS
CW STAFF

WESTWOOD, Mass. — Tomorrow morning, at the last annual meeting of Cullinet Software, Inc. without the subscript "a division of Computer Associates International, Inc.," votes will be tallied, final technicalities will be observed, and the deal will go down.

By the meeting's end, one of the earliest entrepreneurial software companies will belong to the industry's reigning software conglomerate.

"It's a weird feeling, but it's almost anticlimactic," a Cullinet spokesman said late last week. "It's been a weird feeling all summer, ever since we found out about the merger." CA's $334 million bid for Cullinet, financially devastated by two years of product-line turnaround and corporate reorganization, was announced and accepted in June.

The end of Cullinet's independent status, however, shows no sign of ending the company's long tenure in the rumor mills. Other than the fact that he will not remain with CA, the future plans of Cullinet founder and Chairman John J. Cullinane are currently unknown.

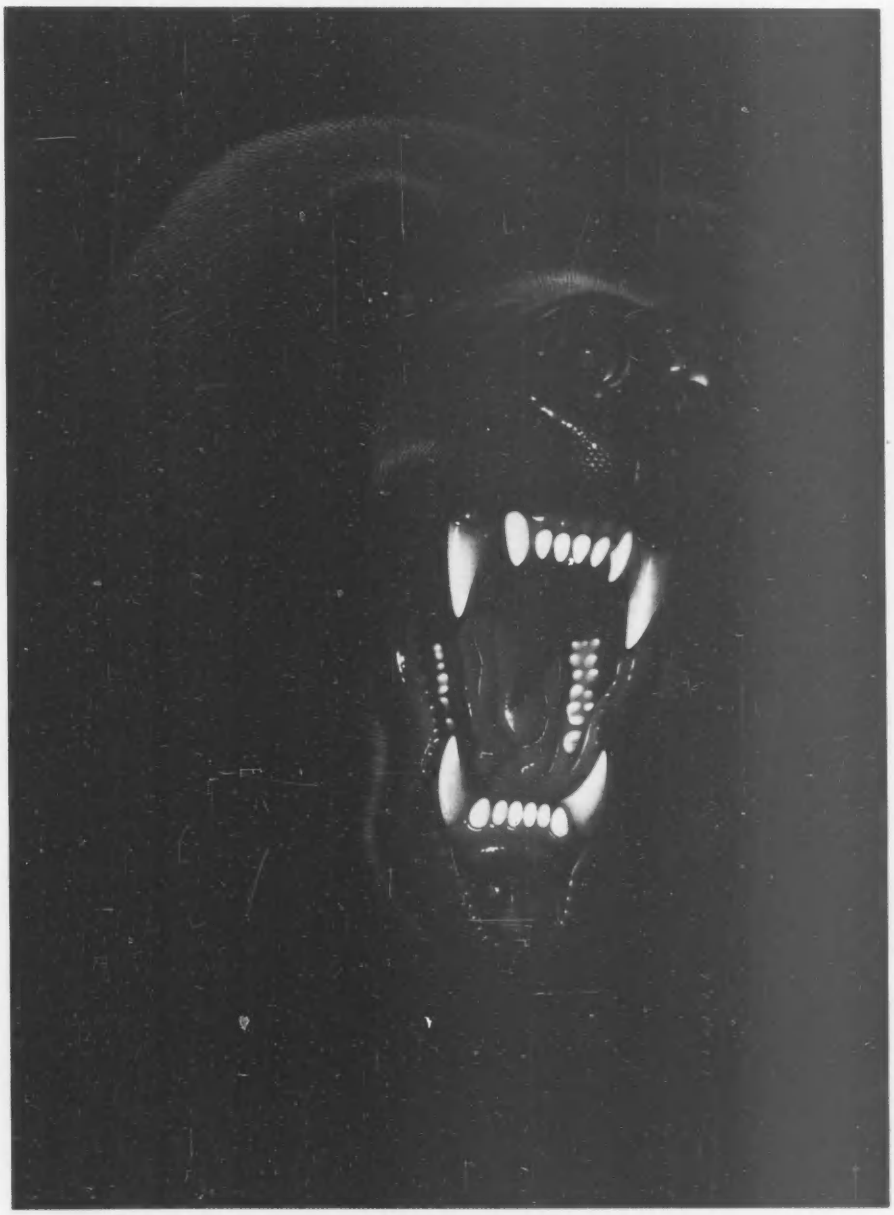
Executive speculation

Equally subject to speculation are the intentions of Cullinet President Robert K. Weiler and Executive Vice-President John B. Landry III, Weiler's longtime associate and Cullinet's acknowledged technological guru.

Even as the final papers were being prepared last week, the fate of Cullinet's fledgling banking software offering was rumored to be in abeyance.

According to a source close to the company, CA is entertaining plans to triage the Cullinet package, which has received kudos from market analysts and early users, in order to concentrate resources on banking software products from an earlier acquisition, Uccel Corp.

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General Signal

FROM PAGE 1

executive, makes no secret of his ambition to become a chief executive officer. It is a mind-set that he has tried to instill throughout GSS — and that helped the company get its IBM and Digital Equipment Corp.-based data center up and running in less than 90 days in 1987.

"Everyone from senior managers to third-shift computer operators had a sense of accountability for getting the job done," said GSS Director Chris Getman, who oversaw the data center start-up. An avid sailor on Chesapeake Bay, Getman believes strongly in the team concept to accomplish any goal — especially in a data center where 35 of the 41 employees, including Getman, were transferred from General Signal business units. "Everyone must know that it's just as important for them to do their jobs as Steve or me," he said.



SAL IHMARCIV/BLACK STAR

Gladyszewski *(left) and Getman directed General Signal's consolidation*

GSS, formed in the spring of 1987, took over its 9,000-sq-ft facility from its Leeds & Northrup unit's former systems division in June. Its first IBM 3081K was up and running Sept. 7, and GSS converted its first customer, Leeds & Northrup's Instruments Division, on Sept. 21. "We were installing disk drives in one part of the room while the floor was still being laid in another," Getman recalled. DEC capability was added later.

According to Gladyszewski, the consolidation has saved General Signal more than $5 million over two years in cost avoidance, or funds that its units would have spent on additional processing capacity, packaged software and people. "Our two goals are to save money and deliver service to the unit that is better than, or at least equal to, what they had before," he said.

Service generally is better, said MIS directors at General Signal's business units. The drawbacks of sharing CPU resources with other units are outweighed by the benefits, said Jim O'Hara, director of MIS at Mixing Equipment Co. (Mixco) in Rochester, N.Y. Centralizing Mixco's Cullinet Software, Inc. manufacturing applications on one of the two 3081Ks at the North Wales data center allowed Mixco to migrate the software from IBM DOS/VSE to MVS/XA.

"Without the consolidation, it would have been very difficult to convert," O'Hara said. "The CPU we're running on is a bit overloaded, and there can be a response problem at peak times, but we have a lot more computing power to work with. There's much better turnaround on the batch runs."

Jim Hicks, director of MIS at Lindberg Corp. and Blue M Electric Co. in Watertown, Wis., said that consolidating his units' DEC VAX 11/780 and 11/785 environments on the VAX 8810 in North Wales has been "a godsend to us. We were out of CPU horsepower," he said. "To the users it's transparent, while we've given up systems software responsibility, which is one headache I don't need."

Gladyszewski racks up frequent-flyer miles on what he terms "GSS sales calls" — pitching the benefits of cost savings and added capacity to unit IS managers from Fremont, Calif., to Raymond, Maine.

"My profit objective is all in savings," he said. "The goal is simple: Charge the units less. The more successful I am, the less I'll spend. In some companies, a bigger budget means a promotion. If my budget doubled, I'd get fired."

GSS' no-frills operation features used CPUs, leased analog telecommunications links and a Scrooge-like approach to systems software. "We don't need six different text editors," Gladyszewski said.

GSS also handles most of its own disaster-recovery capacity. Although the Andover, Mass., data center was converted from an IBM to a DEC and Hewlett-Packard Co. shop when General Signal acquired GCA Corp. (see story below), one corner of the computer room is reserved for an IBM mainframe as a warm-site backup to North Wales. On the DEC side, each data center is a hot-site backup for the other.

GSS continues to convert new business units to its centralized services each month, with most U.S. units targeted for conversion by the end of this year. Exceptions are units based on IBM System/36 or 38 hosts running Mapics software. GSS' minicomputer manufacturing resource planning standard is Ask Computer Systems, Inc.'s Manman on DEC and HP platforms. General Signal's five California-based units have retained their own processing, but GSS hopes to consolidate them in a DEC and HP data center in Santa Clara, Calif., early next year.

In every conversion, transparency to end users at the business-unit level stands as a top priority.

"Our joke is that each unit should put a cardboard box where their computer was, paint it blue, and no one would know the difference," Getman said. "When users call with a question about what to do in a situation, our answer is almost always, 'Just do what you did before.' "

Decentralized company, centralized service

General Signal Corp. consolidated its IS operation while leaving its business units to run autonomously

General Signal Services	
New England data center Andover, Mass.	**Mid-Atlantic data center North Wales, Pa.**
2 DEC VAX 6310 (cluster) HP Spectra 955 HP 3000 System 70 (two more planned)	IBM 3081K (VM/VSE) IBM 3081K (MVS/XA) DEC VAX 8810/6220 (cluster)
Processing for 12 business units Supporting 800 users	Processing for 10 business units Supporting 1,500 users

SOURCE: GENERAL SIGNAL SERVICES — CW CHART: DOREEN DAHLE

Suddenly a businessman

Bob Barnwell made a midlife career change practically without leaving his desk.

Barnwell was the top information systems executive running an IBM 3083-based data center for GCA, a semiconductor fabrication equipment maker in Andover, Mass. GCA fell on hard times during the mid-1980s chip industry downturn and was acquired in 1988 by General Signal. That company transferred GCA's processing to its own IBM data center.



LIGHT MECHANICS

GSS' Barnwell

But Barnwell, a 15-year veteran of GCA, stayed on as the former GCA data center became the New England Data Center for General Signal Services, the centralized processing utility formed by the parent company in 1987. In his new career, Barnwell heads the operation, providing Digital Equipment Corp.- and Hewlett-Packard Co.-based processing to 12 General Signal business units.

"I joke that I'm getting my MBA on the job," Barnwell said. "It's much more like running a business instead of an IS department."

Ironically, Barnwell was studying a possible conversion of GCA's processing to a DEC environment when the merger was consummated. However, it made more sense for General Signal to keep GCA on IBM platforms running Cullinet Software, Inc. manufacturing applications because General Signal already had several business units operating in that environment.

In the end, the IBM applications moved out and Barnwell stayed, both participating and steering his staff through DEC and HP training.

"We were all IBM types," he said. "But the retraining wasn't that bad. Learning the new technology was a challenge, but the concepts aren't really different."

CLINTON WILDER

Fed Micro show caters to user needs

BY RICHARD PASTORE
CW STAFF

WASHINGTON, D.C. — The Federal Microcomputer Conference and Exposition is not the place to show off upcoming 80486-based hardware or OS/2 applications. The federal users who make up most of the show's attendees — as well as the user groups who run it — do not want to see state of the art.

Because of strangulating budgets and procurement periods that can take two or even three years, "federal users can't just turn around and pick up the latest technology," explained Jerry Schneider, executive director of the Association of PC User Groups and program director of the third annual Fed Micro show, which was held last week.

"We need things that run on 8088s and 286s, and vendors have to respond to that," Schneider said. "More vendors are recognizing that they can't lead users willy-nilly, particularly in the federal market."

On the morning of the show's opening day, Schneider said, "On the floor, you'll see a number of vendors who provide tech upgrades to existing Zenith machines; they know we can't easily replace them."

One such example was Waltham, Mass.-based Aox, Inc., which unveiled an Intel Corp. 80386 upgrade board for the 80286-based Zenith Data Systems Z248 personal computer. About 400,000 of these PCs are in use in federal offices.

Lotus Development Corp., with its 1-2-3 Release 3.0, is one example of a vendor that failed to account for the limitations of federal users' platforms.

"Lotus missed the target. The platform to run it is just not out there," said Glenn Hall, president of the Integrated Software Federal Users Group. The recent upgrade requires a 286-based machine with at least 1M byte of random-access memory.

Recognizing that the civilian federal agencies and the U.S. Department of Defense are equivalent to the Fortune 1 and 2, some 200 vendors set up shop at the Washington Convention Center. All-American vendors were clearly dominant, including such major players as IBM, Compaq Computer Corp., Microsoft Corp. and Zenith. Several attendees among the estimated 20,000 said they were impressed by the big names that showed up.

It has not been easy for vendors to crack the federal nut. Learning how to market to government buyers was a frustrating trial-and-error process, said Courtney Parker, marketing vice-president of Houston-based Welcom Software Technology.

"You have to do things patiently," Parker said. "You won't get a sale in two months; it may be 12 months." It takes longer to build a relationship with federal customers, but the reward is usually a customer who will buy in high volumes, he added.

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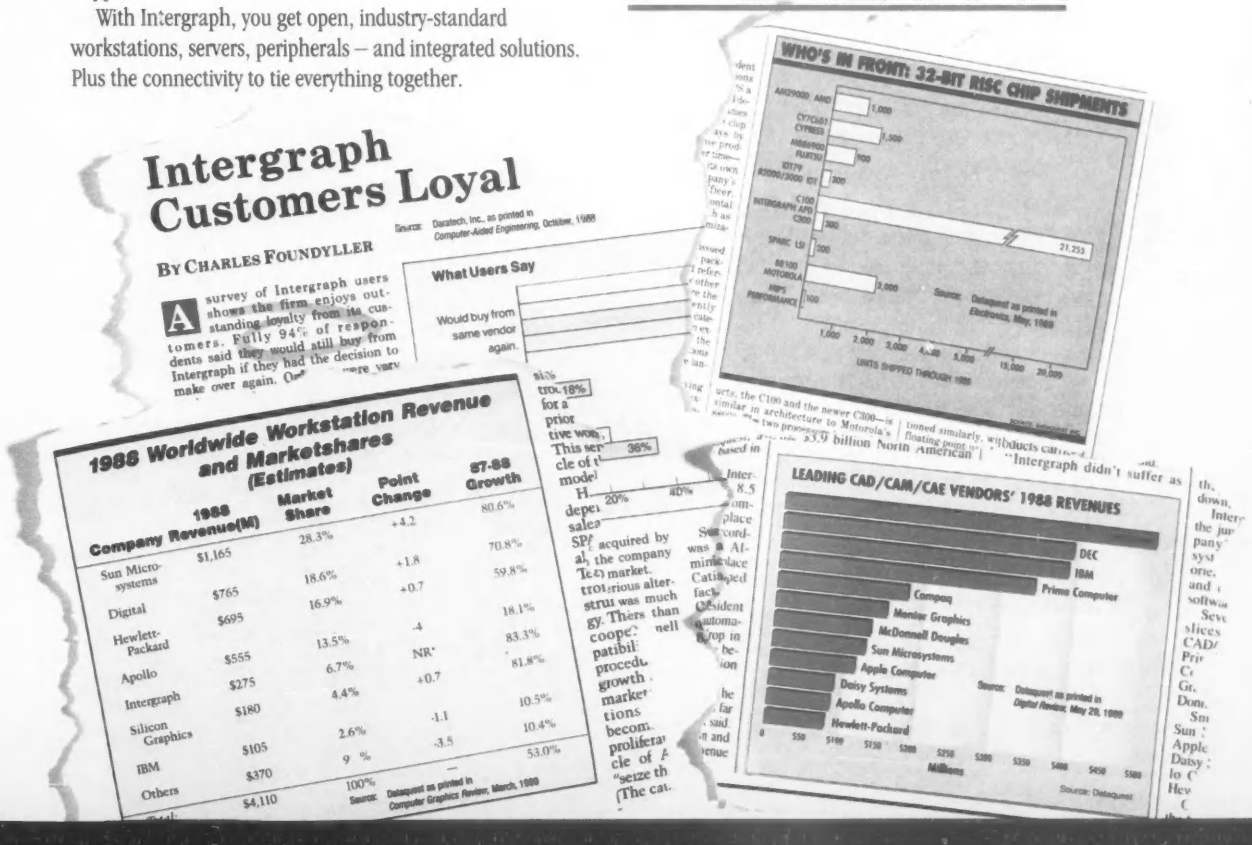
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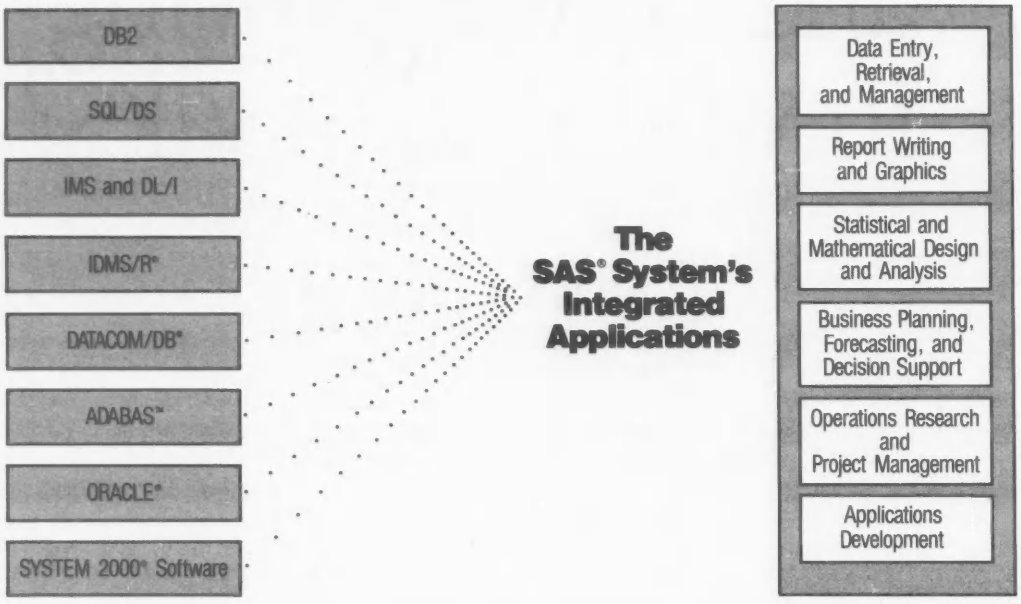
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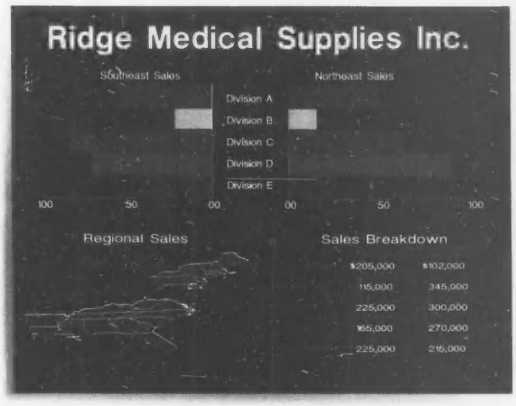
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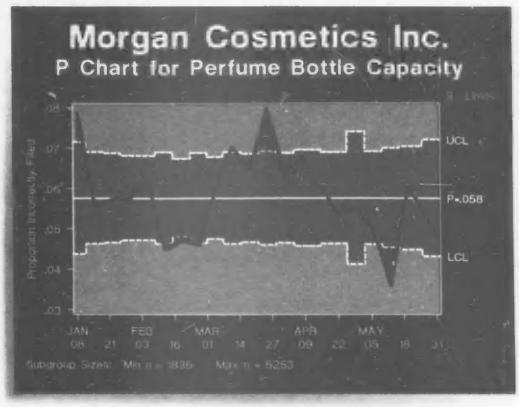
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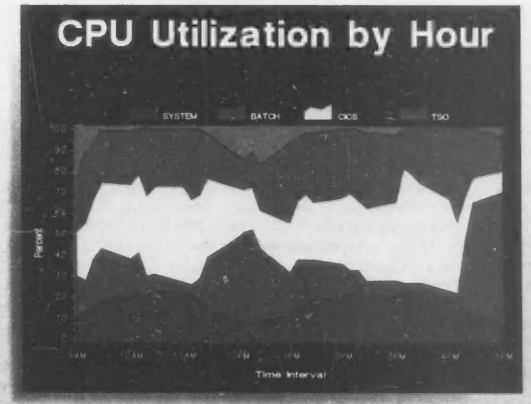
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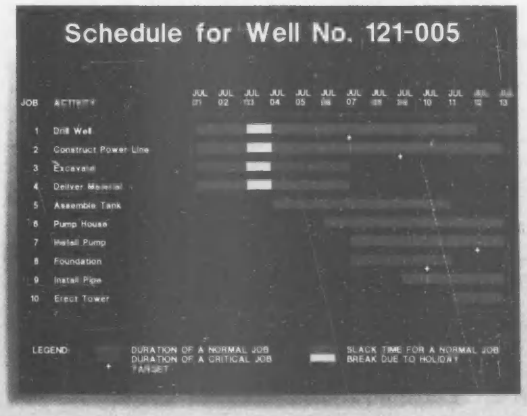












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EDITORIAL

The next cycle?

HUGO SIMPSON TELLS an interesting tale about a trust company that was dealing with a particularly thorny development project.

According to Simpson, vice-president of information and productivity systems at Unisys, the trust company's IS staff had estimated the cost of the project and calculated it would take 150 man-years and $20 million using traditional project development methodologies and techniques.

Unisys approached company executives through a third party and attempted to sell them some project automation tools and program engineering methodologies built around Unisys' fourth-generation Linc facility.

The reception from the Cobol crowd at the trust company was cool at first, maybe even hostile. It took an appeal to the trust's chief executive to approve a trial effort of the automation techniques the vendor had proposed.

The result? The original estimate of 150 man-years was compressed to 54 months, and the $20 million project cost came in under $2 million. Yet the big selling point, Simpson says, was not the savings. Rather, the greatest allure of automated programming techniques was the promise of adaptability — how quickly IS could respond to business changes by bringing new projects on-stream in a timely fashion, at least before the business environment changed and rendered the project largely obsolete.

Despite such stories of success from the annals of automated programming, the overwhelming majority of development is still undertaken using fairly traditional and costly development techniques and methodologies.

Because of this, Simpson is pleased with the programming announcements expected next week from IBM [CW, Sept. 4]. With the unveiling of AD/Cycle and the long-awaited repository, IBM will legitimize automated applications programming — or so Simpson and others hope.

Documents circulated by IBM indicate an intention to automate applications development over the entire development cycle, from requirements to design to maintenance. The documents also refer to IBM's desire for "openness" with AD/Cycle interfaces and its aim to "protect" investments in IBM applications and data.

This all sounds great, even to some of IBM's most ardent competitors. But through the information available now, we have to ask whether this significant strategy announcement is evidence of IBM's commitment to the customer base or more a commitment to itself. Perhaps the company sees these two as one in the same.

Are we really going to see a commitment to openness that is very much in line with the strongest undercurrents in the user community? Or will this openness more resemble the proprietary bus and proprietary operating system of the AS/400 or the intensely proprietary constructs of SAA?

Perhaps soon we will all have a better idea of just whose investments AD/Cycle is poised to protect.



LETTERS TO THE EDITOR

Morris: Does punishment fit crime?

Regarding the degree of culpability of Robert T. Morris Jr. [CW, July 17], it appears to me that the situation is the same as if one of the neighborhood kids knocked a baseball through a window — with a Ming vase behind it. In such a case, decapitation is not usually found an appropriate punishment.

In this case, spending one-fifth of one's entire life (five years) behind bars and levying a fine of five years' salary (at $50,000 per year) would seem a bit extreme.

The state of data security in this country is appalling. In my experience as a data processing consultant, I cannot count how many times I have logged onto a system with superuser privileges while just testing access procedures, how many times a system console was left available to anyone who would walk in and how little attention was given to password security. Perhaps the owners of the systems that the worm impacted should, as Robert Glass suggests, be prosecuted for maintaining an attractive nuisance.

To hold an individual solely reponsible for the full dollar value of damage — damage that easily both could have and should have been substantially limited by the damaged party — is against both common sense and common law.

In refusing to take elementary security precautions, the managers of the facilities on Internet showed themselves to be a substantially contributing factor to the damage, if not criminally negligent.

John H. Kennedy
CPA
Mountain View, Calif.

Perhaps the subject of Robert Morris is overworked, but I certainly got worked up when I read Bill Fletcher's letter to the editor [CW, Aug. 14]. Fletcher says he believes that Morris should be rewarded for creating a worm that infested over 6,000 computers, resulting in countless hours of lost time required for restoration.

By logical extension of his argument, bankers whose banks are robbed should be jailed and the bank robbers should be rewarded because they pointed out the flaws in the building security system.

Fletcher seems to think that our entire criminal justice system is pointed in the wrong direction because it punishes those who so graciously point out the errors in systems built to protect life and property from those who would destroy them.

My point is that regardless of security, whether computer or building system, someone is intent on breaking it, and to write such breaches off as "gross mismanagement error" is avoiding the core of the problem. Security is extremely important, and, as many convicted bank robbers know, punishment is a good deterrent.

Kenneth Bush
Indianapolis

Key to the map

In "Can you manage quality into a software product?" [CW, July 31], Robert Glass wrote: "It is well accepted that quality cannot be tested into software because testing only looks at reliability, one facet of quality, and because testing comes too late in the life cycle to have a preventive effect on poor quality."

This statement is both right and wrong. For testing as understood and practiced in most of industry today, the statement is essentially correct. Current practice focuses primarily on finding bugs during test execution and (after a number of debugging cycles) showing that code works.

However, this form of testing is out of date. More and more organizations use testing to prevent problems and to drive quality into software. These organizations have shifted their emphasis from execution to timely planning and have experienced testing's power to clarify and correct software requirements.

The prevention tools of testing are the question and the test description. As testing seeks to determine the software behavior required in different situations, questions are asked and problems found. As requirements are identified, testing must determine how each can be investigated.

For example, if performance, security and safety are required, then how should their presence be shown? During the struggle to define tests, requirements are clarified. When testing explores requirements early, the problems found prevent design and implementation bugs.

David Gelperin
Software Quality Engineering
Minneapolis

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.*

No escape from computers

HARVEY P. NEWQUIST III



I have begun to feel like I am permanently attached to my computers — physically and perhaps even emotionally. I'm beginning to wonder if I can function without ROMs and RAMs as part of my daily life.

My electronic mail, magazine articles, tax returns, telephone numbers and most of my nonpersonal relationships with the outside world exist — nay, live — inside my 286 and 68030-based organisms.

There are two main computers in my office — a Personal Computer XT and a Macintosh II. Both are hooked into larger systems so I can retrieve information from more than one place at a time. Of course my own brain cannot handle this data once it is received, but I sleep better at night knowing that such a capability exists at my fingertips.

In addition, my laptop computer usually sits between these two machines, waiting either for my next business trip or for some moment when I can't access my PCs.

I have some 160M bytes of memory for storing information on these machines. This is more than most humans need and perhaps more than most deserve. Yet I don't always feel as though it's enough. Call it storage greed; call it memory gluttony. If these were biblical times, you'd probably call it a sin. Nonetheless, when I feel as if I'm running low on memory, I go visit my fiancee. She has 40M bytes on her own system.

Homeward bound

Such computer addiction does not stop at my office. It extends into my house, right into my yard. Last week, my landscaper came over for a consultation. This didn't involve blueprints or huge sheets of paper extensively marked up with pencil. Instead, the landscaper popped a software disk into my Macintosh, which gave me a three-dimensional layout of my yard and house, and a view of how new shrubs would look once installed. I just sat there watching, somewhat in awe, although I could see myself on the screen — a little wire-frame stickman positioned inside a little 3-D house on a computer screen. Franz Kafka probably would have had something to say about this turn of events.

This fever even extends to my friends and family. My father just sent me a copy of his most current project — tracing our family lineage. As I opened the bound book I fully expected to see line after line of carefully calligraphic names traced lovingly to faded sepia pictures pasted on yellowing pages. Instead, there were crisp Helvetica fonts (in bold and italic) wrapping around photographs that had been scanned onto a piece of software specifically designed for building family trees. Dad will be publishing regular editions as new additions come into our family. This used to take years of labor before software — the rewrites, not the babies.



PAUL FISCHE

I even attempted a safari in Africa last year to get some respite from computer overload. Turns out the guide was an ex-IBM systems programmer who decided to do research on native African birds and was recording his findings in a portable PC that he powered off the generator of his Land Rover. He does this more than 1,000 miles from the nearest IBM product center.

To get a little further away from all of this computer omnipresence, I relax by playing and recording music. Sitting down to the synthesizer keyboard, I hook my keyboard's computer interface into one of my PCs, and every single keystroke, each lush arpeggio and trill, is recorded onto sequencing software that will play it all back on command, exactly like a player piano. Only now you don't have those big rolls of floppy paper on a spindle; you have a compressed piece of magnetized plastic on a floppy disk.

When I mentioned that I feared becoming emotionally attached to my computer, I'm not sure that I was joking. When it recently contracted a virus (from playing after-hours in a bulletin board service playground with other PCs that were already infected), I stayed up for two straight days feeding the PC vaccines designed to kill everything from Scores viruses to the menacing nVIR. I treated it as tenderly as one would treat a sick relative. Sure, sick relatives don't hold all your business records for the past five years as well as your comprehensive financial statements, contact lists and the latest version of Beyond Castle Dracula, but that's besides the point. I would care for them even if they could do all that for me.

I recently addressed a group of financial managers in London. No simple automated teller machines for these business people. An informal poll of the 200 members of the audience showed that more than half were already investing in intelligent technologies such as expert systems or knowledge bases for their companies.

I personally have not seen a single human being regarding my bank account in almost two years. Sometimes I wonder if anyone still works there.

Now I am writing this at close to 40,000 feet over the Atlantic Ocean. My computer is on my lap, and I am flying over Iceland. In my attempt to find an escape from computing for just a moment, I envision the icy expanse below without any computers. I am enjoying the reverie until I realize that the last expedition up Mount Everest managed to take a portable PC with them up that mountain's snowy heights. Somewhere below, I now admit to myself, there is an ice castle — on-line.

Newquist writes and consults on artificial intelligence and other advanced high-technology topics from his office in Scottsdale, Ariz.

MIS majors: Can they meet business expectations?

NILAKANTAN NAGARAJAN



There is continuing controversy about the quality of students graduating from the nation's educational institutions. Business schools have been accused of inadequately training their graduates to meet the real-world needs of the organizations they are supposed to serve.

Such a disparity exists to a greater degree in the field of IS. As the industry has evolved over the past three decades accompanied by rapid strides in technology, there have been tremendous changes in the need for and demands on IS professionals. Many students strongly feel that they are not getting the basics during their four-year stay on campus and that curricular offerings do not adequately meet the real needs of the job market. The same sentiments are shared by many prospective employers. They find that entry-level employees are poorly equipped and arrive needing retraining.

In this unenviable environment, business schools, professional associations and the industry must read the writing on the wall. Together they must plan for and properly provide students with the knowledge, training and conceptual background required of them in the real world of business.

In the IS discipline, a student should be made fully aware of the different segments and subsystems in the business organization and intertwining relationships involved in the process of developing an effective information system.

However, many campuses lack even the basic facilities of computer hardware and software and faculty that are adequately equipped to train students in the changing needs of information technology. As a result, students as well as prospective employers lose faith in the system, and the degree becomes mere paper.

This spring, I conducted a survey of 94 IS executives in different types of business organizations located in the Greater Hartford, Conn., area, asking about their expectations for entry-level employees who are business graduates majoring in IS disciplines.

The following items topped the list of general IS competencies that they sought:

- Structured approaches for systems development and programming, file organization and design, documentation and maintenance.
- Job control languages and operating systems.
- Data communications.

Subjects such as AI, expert systems, computer graphics and simulation came in relatively low, perhaps because of their technical orientation. Employers do not seem to expect entering IS employees to have much depth in those fields.

Surprisingly, important disciplines such as decision support systems, information resources management and electronic data processing auditing also ranked low in the survey. These subjects are offered in most IS curricula and are even recommended by DPMA as electives. One may conclude that these emerging topics haven't gained acceptance among IS executives or that employers don't expect IS majors at the bachelor's level to be knowledgeable in these advanced topics.

Programming needs

In the area of programming, a need for assembler language has lost its place to the need for languages such as C and Pascal.

Emerging environments such as 4GLs, Unix and LANs ranked higher than older products, which again stresses the essential need to move with technology trends. In areas of related education, there were no surprises in the top three items. IS executives stressed the crying need for student preparation in oral and written communication and interpersonal relationships.

The study largely supports earlier findings of similar studies as well as my own feeling that business schools must orient their curricula to fit the changing needs of the business world.

Toward this end, I strongly recommend a "Sputnik" approach to the academic challenge. First, university administrators should provide support to faculty development and retraining in the information technologies to keep instructors cognizant of the state of the art in their own disciplines.

Second, businesses and other professional groups should provide strong support for the emerging trends of information technology to higher-education institutions, in the form of equipment, funds for further study and academic support materials.

Finally, government agencies should provide funding and coordinated support for the training and retraining of faculty in the realms of rapidly changing technology.

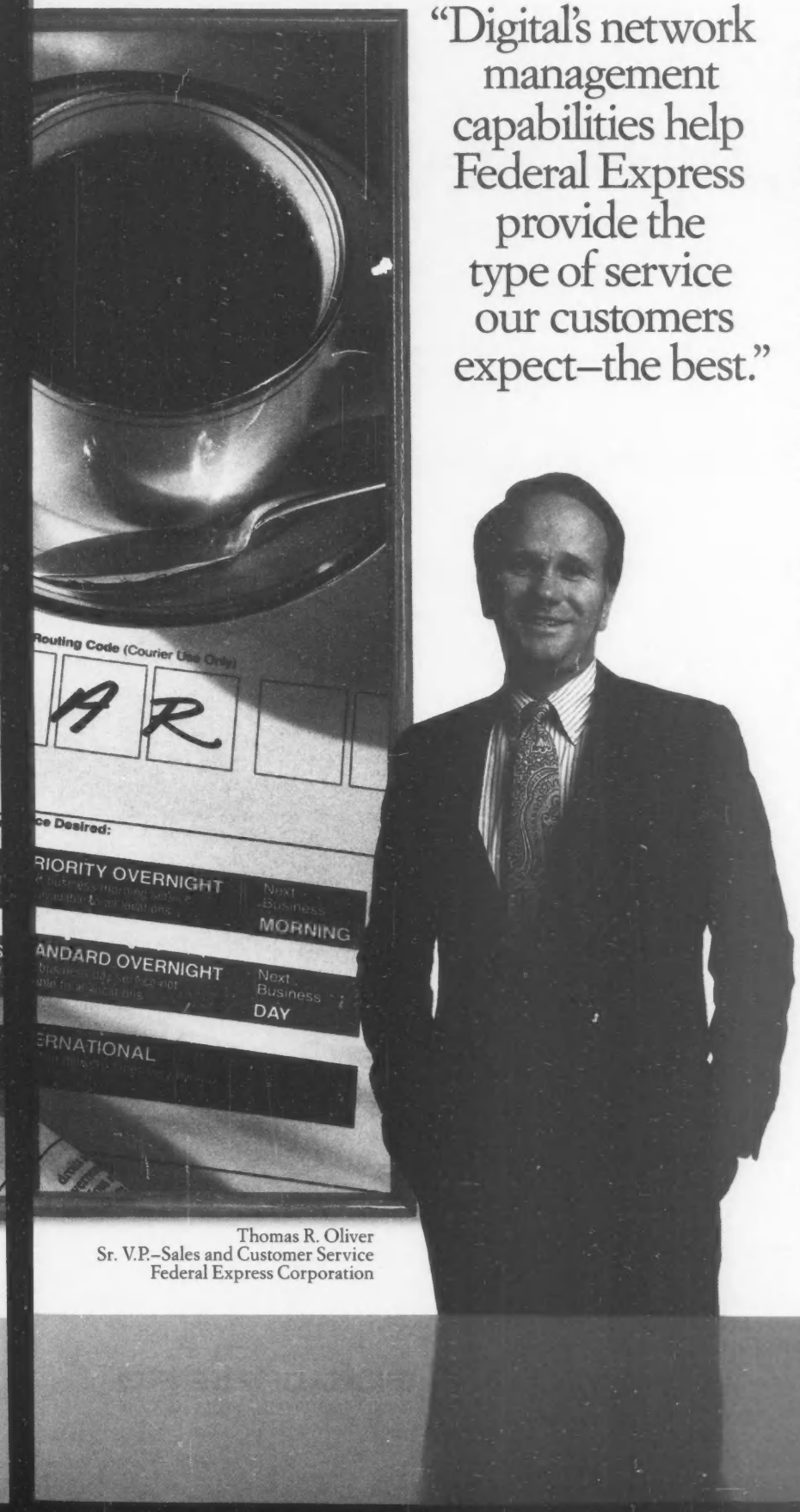
Nagarajan is an associate professor of MIS at Central Connecticut State University's School of Business in New Britain, Conn.



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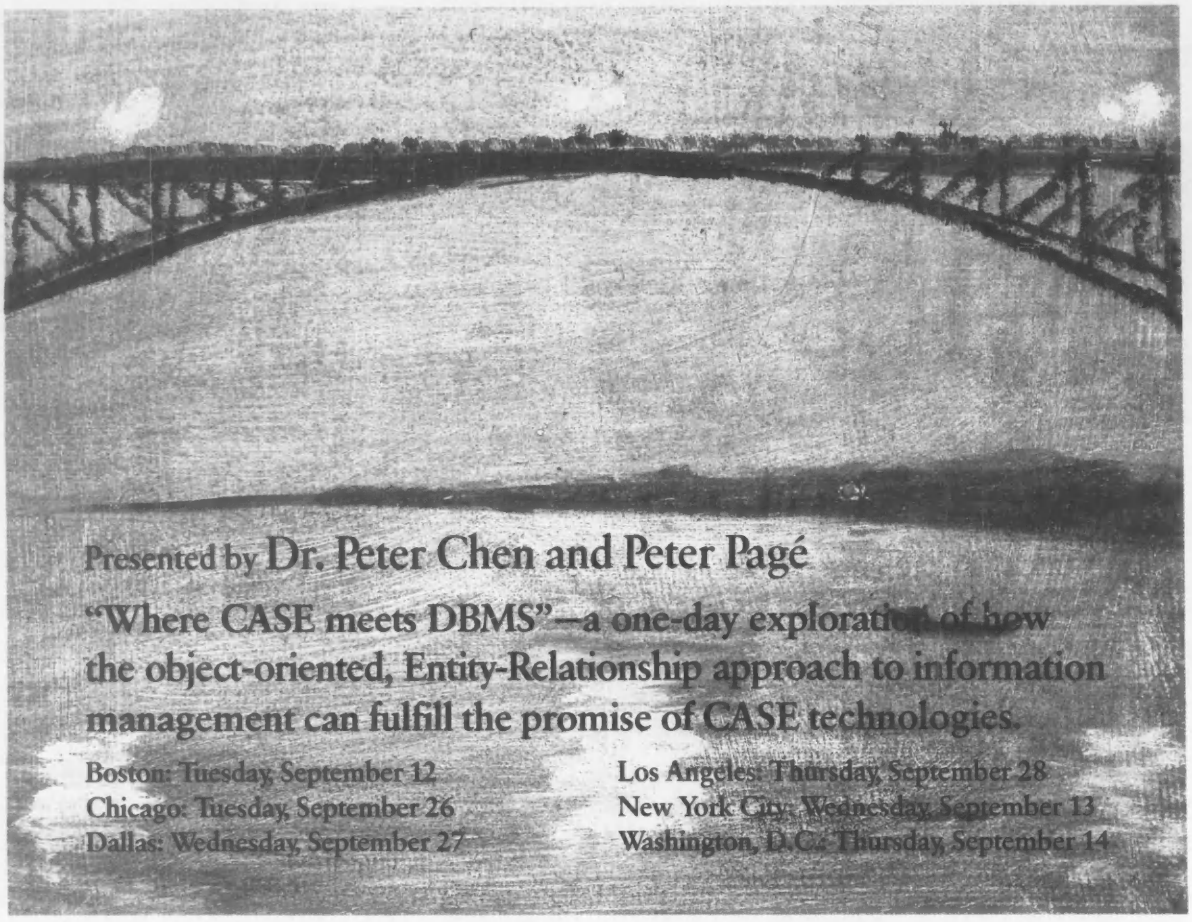
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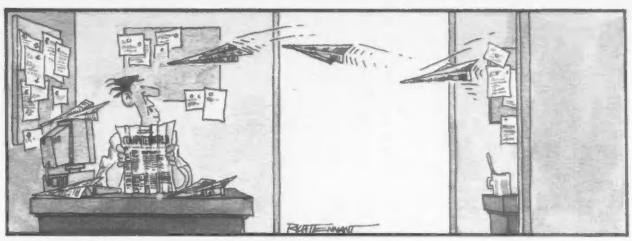
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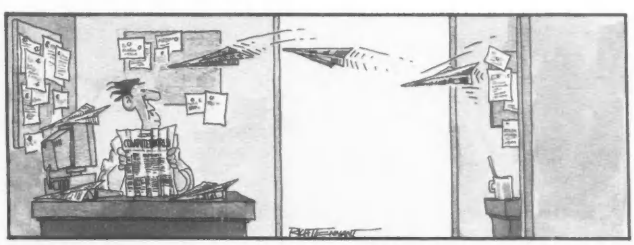
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SOFT TALK

Stanley Gibson

Bundle up, Adapso



Despite the efforts of some gallant old warriors within Adapso to revive the antitrust fervor of the 1960s, trying to oppose the trend to merge a database management system with an operating system is doomed to failure.

Adapso's ire was triggered by several events: DEC's bundling of its RDB relational database management system with its VMS operating system and its intent to bundle an RDBMS based on Relational Technology's Ingres with Ultrix.

In addition, Adapso has targeted IBM's AS/400, which boasts an RDBMS integrated with its OS/400 operating system.

The AS/400, however, can be seen as the cause of DEC's bundling. Because AS/400's technology presents a strong competitive challenge to DEC, the company felt it had to respond in kind.

But the AS/400 is a successor to the IBM System/38, which came onto the market 10 years ago and similarly offered an integrated RDBMS and operating system.

Why was there no noise during the past 10 years? Because the System/38 was never a great competitive threat. It did not occupy a key strategic niche in IBM's marketing master plan, so no one worried about it. DEC didn't feel threatened,

Continued on page 32

A supermarket with SMARTs

BY ELLIS BOOKER
CW STAFF

EVANSTON, Ill. — To the consumer in the checkout line, a bag of egg noodles could mean tonight's tuna wiggle. But to researchers at Andersen Consulting's SMART Store 2000, that bag, once scanned by the checkout counter's bar-code reader, can be transformed into a data point in several interconnected electronic systems: an inventory tracking database, an electronic demographic profile of store patrons and even an exception-reporting system that alerts the store manager to buy 100 more boxes of noodles.

Andersen's SMART (Super Marketing through Applied Retail Technology) Store 2000 is a test bed and demonstration lab featuring 75 pieces of technology from approximately 30 vendors. The store opened during the Food Marketing Institute's 1989 Supermarket Industry Convention here in May.

Like Andersen's computer-integrated manufacturing (CIM) demonstration center, which occupies another floor in its System Integration Center, the SMART Store primarily uses off-the-shelf devices and technologies. Linking and integrating these systems is where Andersen's know-how comes in.

The ultimate users

CIM technology generally attempts to streamline a production process while simultaneously providing the manufacturer with greater amounts of timely information. Likewise, a number of the systems deployed at the SMART store help retailers work faster and more efficiently by automating, for example, employee work schedules. However, other applications on display at the SMART Store focus not on a process but on an ultimate user of a supermarket: the shopper.

"The idea is to get close to the customer," explains Patrick T. Mullarkey, Andersen's SMART Store 2000 project manager. He noted that food retailers have traditionally been supply-oriented ("How do we sell that gross of Cheese Wiz?") rather than demand-oriented ("Do customers want Cheese Wiz, or would they like Brie cheese instead?").

Although bar-code scanners began to appear in supermarkets a decade ago, most retail stores fail to use this rich source of information in any sophisticated way to inform their daily operations, Mullarkey said.

However, that is changing, according to Mullarkey, who points to new point-of-sale systems that are coming onto the market. "The first generation systems were pricing- and auditing-oriented," Mullarkey noted. "The next will be information-oriented."

The SMART Store uses point-of-sale gear from two vendors: an IBM 4683 and an NCR Corp. NCR 2127. The NCR unit actually takes point-of-sale files and drops them into an Oracle Corp. database running on an NCR Tower processor.

Underscoring the systems integration approach, Andersen stocks its supermarket lab with a variety of hardware platforms. An IBM AS/400 sits next to the Tower, and both minicomputers are connected to an Apple Computer Inc. Macintosh II, which serves as a terminal for the supermarket manager.

Continued on page 31



TERRY VITACCO

Andersen's SMART Store 2000 *focuses on the shopper*

Apple says good-bye to Cobol; picks 4GL

ON SITE

BY JAMES DALY
CW STAFF

CUPERTINO, Calif. — In another sign that the reigning king of data processing languages should at least prepare to slide over and share its throne, Apple Computer, Inc.'s 400-member human resources department recently began phasing out its Cobol applications in favor of fourth-generation language (4GL) support.

The move came as part of the company's process to replace the department's Digital Equipment Corp. PDP-11 with a DEC VAX 8600 for production and a VAX 8550 for development.

Cobol has long been the target of complaints. Some users contend that the language is verbose and out of date, with a typical software development life cycle taking up to three months to define the requirements and 18 months to write the application.

Proponents of 4GLs argue that they are much easier to use, often using on-screen templates that enable both users and programmers to bypass keypunch operators. Additionally, the product chosen by Apple — Accent R from National Information Systems, Inc. in San Jose, Calif. — employed Macintosh-like menus, windows and pop-up screens.

"Human resources specialists

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Inside

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- CDC's new Cyber models offer more for less. Page 27.
- Unisys to coach IS at Commonwealth games. Page 32.





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Swissair opts out of IMS for Supra

Airline passes on IBM's DB2, moves to Cincom's relational DBMS

ON SITE

BY STANLEY GIBSON
CW STAFF

Showing the self-reliance that has historically been a hallmark of the Swiss, Swissair, Switzerland's national airline, carved its own path in moving from IBM's IMS to the relational world.

Rather than sticking with IBM by opting for its DB2 relational database management system, Swissair performed an exhaustive evaluation of some 50 vendors and came away with Cincom Systems, Inc.'s Supra RDBMS.

"We are a high-skill company and can take a certain risk. We don't need to go only with 'safe' IBM," said Waldo Hasler, general manager of application development at Swissair, who worked for seven years as an IBM systems engineer. Swissair, based in Zurich, had no relationship with Cincom prior to the evaluation process but feels comfortable with the vendor now. "Cincom has always been on schedule, and the product has always worked," Hasler said.

Swissair was taken by the advanced technology of Supra but also found an IMS coexistence facility attractive, Hasler said. In moving to Supra Version 1, Swissair will use a new Cincom facility to link IBM's IMS with Supra.

The IMS coexistence facility has not been formally announced, although it is being used by Swissair and another European company, according to Cincom.

"Cincom was able to offer a migration path," Hasler said, explaining that many gigabytes of data are stored under IMS and that Swissair's new applications need access to the old environment.

Swissair must be able to update both IMS and Supra data with full integrity. Hasler said Swissair has successfully tested the Cincom facility, which includes two-phase commit, and is implementing it.



Swissair's Hasler, *Cincom's Chris Pinchetto and Swissair's Winfried Zweifel and Peter Sturzenegger, from left*

The systems in question manage Swissair's corporate operations, from general administration and finance to aircraft maintenance — everything but airline reservations, which are handled by a specialized TPF system.

Swissair began using IMS in the early 1970s for these systems but decided to move to a relational DBMS in the mid-1980s. Swissair performed its vendor evaluation in 1986 and agreed to go with Supra in 1987.

"We knew we couldn't survive with PL/1 and IMS . . . We needed to position ourselves for Europe '92," Hasler said. Although Switzerland is not part of the European Economic Community, the European competitive climate is expected to stiffen after many international trade restrictions are lifted in 1992.

Swissair was looking for a relational DBMS with a fourth-generation language (4GL) environment and settled on Cincom's Supra RDBMS and Mantis 4GL. "It was the three-schema architecture that influenced us. Most of the others are as old as the IMS system. No other company had such a severe break with the past, implementing three-schema architecture and Codd rules," Hasler said.

Ed Acly, a data base analyst at International Data Corp. in Framingham, Mass., concurred with Hasler's assessment of Supra's implementation. "It's probably the most specific and thorough implementation out there," he said.

Three-schema architecture, first codified by the American National Standards Institute in the late 1970s, consists of the conceptual model or business level; the external model, or application level; and the internal model, or physical level of data structures.

Hasler said Swissair considered IBM's DB2 and Cross-System Product 4GL but added that those products came up short. CSP was "below our requirements," and DB2 offered no data dictionary or repository, he said. Among the 50 vendors' products examined were Software AG's Adabas and Computer Corporation of America's Model 204.

Swissair did not need SQL, which is part of DB2, Hasler said. SQL is not included in Supra Version 1, but is in Supra Version 2. Swissair will be using Supra Version 1 for the next two years and could move to Supra Version 2 after that.

IBM has been urging its customers to keep DB2 and IMS running side by side for the foreseeable future rather than migrate applications from IMS to DB2. IBM offers no IMS-to-DB2 migration aids but suggests users develop all new applications for DB2 only so that more and more applications will be in DB2.

Swissair's IMS applications run on an IBM 3084Q and an Amdahl Corp. mainframe, performing some 260,000 transactions per day.

The only airline in Switzerland, Swissair maintains a fleet of 52 planes, all of which are used for international flights. Switzerland is so small and mountainous that trains are used instead of planes for domestic passenger travel.

How do the cautious Swiss feel about Cincom's recent financial travails in the context of problems in general among independent DBMS vendors?

"There is no risk because the product is so superior that someone will acquire it. We have chosen the product primarily and not Cincom," Hasler said.

Control Data cuts RISC workstation prices

BY ELLIS BOOKER
CW STAFF

MINNEAPOLIS — Control Data Corp. (CDC) dropped prices and raised performance of its Unix-based reduced instruction set computing workstation lines recently, announcing new models in the Cyber 910-400 series and a new high-performance, single-processor model in the Cyber 910-600 series. All the new models, which are built for CDC by Silicon Graphics, Inc., support CDC's computer-aided design and manufacturing and information management systems.

The 910-400 3-D graphics workstation line expands with the 910-460 and 910-470, which feature a 20-MHz Mips R3000 central processor from Mips Computer Systems, Inc. and a floating point coprocessor rated at 16 million instructions per second (MIPS) and 1.6 million floating point operations per second (MFLOPS). In addition, two 12.5-MHz workstations based on the R2000, the 910-430 and 910-440, will be priced 10% to 25% less than current models in the 910 line, CDC said.

The new single-processor workstation, the 910-621, boasts a 25-MHz MIPS R3000 processor and a floating point coprocessor rated at 20 MIPS and 3 MFLOPS.

Prices for the 910-460 and 910-470, which will be available in the fourth quarter, are $21,500 and $30,500, respectively. The entry-level 910-430 is $16,500, and the 910-440 is $25,000. Base price for the 910-621 workstation, available this month, is $94,900; a network server version of the 910-621 will be priced at $59,900.

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Memorex package tracks IBM 3480 tape errors

BY JEAN S. BOZMAN
CW STAFF

SANTA CLARA, Calif. — Citing the requests of large IBM mainframe users, Memorex Computer Supplies, a division of Memorex-Telex N.V., has developed a software package that tracks IBM 3480 tape-cartridge errors and pinpoints their cause. Memorex is a major supplier of 3480-type cartridges used in mainframe shops.

The package, called the Automated Cartridge Evaluator (ACE), tracks media performance by media vendor, time period, cartridge number and by the 3480-type cartridge drive. The ACE software runs on the IBM mainframe, under MVS/XA or MVS/ESA.

ACE, priced at $15,000, is delivered on a 3480-type cartridge. The one-time fee includes documentation, the first year of maintenance and on-site support and training. It competes with a tape-management product called Tapeview that is sold by the Computer Management Services division of Deere & Co., in Moline, Ill. Priced at $14,200, Deere's product tracks media usage and failures but does not evaluate media quality.

"ACE started two years ago, when our customers said they had difficulty determining if a cartridge error was due to bad media in the cartridge or to a faulty tape drive," said Memorex spokeswoman Catherine Derr. ACE analyzes the pattern in which data blocks are written on the tape and logs the amount of data stored during various work shifts.

Tape storage expert Ray Freeman, president of Freeman Associates, Inc. in Santa Barbara, Calif., said the Memorex software would be helpful at large sites. "This is a high-end refinement of the 3480 technology that a big installation with multiple vendors would find useful," Freeman said.

However, he added, sites committed to a single vendor, such as Storage Technology Corp. or IBM, might have less need for it.

Apple

FROM PAGE 25

are very concerned about the ease of use of their applications," said Steve Austin, manager of human resources systems within Apple's information systems and technology group. "They are sensitive to the user interface and love their Macintoshes. If they receive a traditional-looking mainframe screen, they're unhappy."

Each human resources specialist accesses the 8600 from a Macintosh equipped with a DEC VT200 terminal emulator software from Versaterm. The first application that was written in Accent R was the job requisition system that allowed human resources personnel to enter requisitions for jobs, track open jobs, produce reports and analyze the productivity of the consultants and liaisons.

First impression

Early impressions were extreme. "When the software was first demonstrated, [our users] applauded," Austin said. "The screens are much more intuitive and easier to use, and I can finish 10 to 15 software changes in a week instead of four weeks."

Austin also said he has seen a 50% productivity gain since the implementation began, while report generation has doubled.

Still, 4GLs are not all things to all people, Austin noted. They eat up a lot of system software and can quickly degrade response time to other users. If users have specialized needs, they can sometimes be difficult to use.

These are limitations, however, that the users are willing to accept. "Convincing my programmers to maintain old programs in Cobol is the only problem I now have," Austin said.

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Supermarket

FROM PAGE 25

Currently, three functional and interconnected modules have been deployed in Andersen's SMART Store, which has hosted about 600 visitors since May.

The modules include a store manager's workbench, a custom-developed executive information system that collects and summarizes operating results, customer and store traffic patterns and personnel; and a merchandising workbench, which coordinates the store's inventory based on actual sale and customer data. Also included is a marketing workbench, which grooms demographic data from a compact disc/read-only memory-based database from Donnelly Marketing Information Services and calibrates it with sales information from the store to develop a winning mix of food products and value-added services.

A fourth module, still under development, is the chief executive officer's workbench. This workbench will allow the managers at headquarters to view the activity of all the stores in the chain. Work is also ongoing to link the modules to an IBM 9370.

Hungry for applications

Interest in information-intensive applications for food stores has grown, in part because communications standards have been maturing. The Direct Exchange Uniform Communications Standard protocol, or DEX UCS — essentially the food industry's electronic data interchange standard — has been gaining momentum over the past couple of years, Mullarkey noted.

Similarly, the Network Exchange Uniform Communications Standard, or NEX UCS, a communications protocol for food manufacturers and distributors and supermarket chains, is becoming more useful.

Supermarket chains are ready to pluck these sophisticated technologies and refine their increasingly targeted consumer marketing, Mullarkey said. "There's a big push to micromarketing, and capturing data from the checkout line is what makes it possible," he said.

Shoptech

Technologies on display at Andersen Consulting's SMART Store 2000 demonstration center that you may soon find in a store near you include the following:

- **Electronic shelf tags.** No more tripping over stock boys and stock girls when these 2- by 4-in. radio-controlled price tags are in place in your local market. Once a stock item's price is changed in the central database, the LCDs on the shelf tags change automatically. Meanwhile, shelf stockers will consult a "shelf-stacking optimizer" program to get the most out of each inch of shelf space.
- **Frequent buyer cards.** Analogous to the frequent-flyer promotions offered by airlines, these smart cards, inserted into a "customer center" terminal inside the supermarket will allow food companies to offer discounts and special deals to brand-loyal consumers. This and other services (how about ordering airline tickets while you pick up a gallon of milk?) will be rendered via devices like one NCR now has in production. This customer center, reportedly due out later this year, features a laser disc and a touch screen.
- **In-store shopping lists.** Since the database in the back of the store knows what you bought on your last visit, the customer center can print out a list of items you might be running low on or individualized lists of new items (such as diet egg noodles) of interest to you.

ELLIS BOOKER

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SOFT NOTES

Tandem in systems integration deal

Tandem Computers, Inc. and **Westinghouse Electric Corp.'s** Electronic Systems Group in Baltimore will jointly market computer systems integration products and services.

The offerings of the two firms will include systems integration, business planning, applications reengineering and software development and support. Targeted industries include aerospace, electronics and manufacturing, the two firms said.

Relational Technology, Inc. (RTI) signed a joint marketing agreement with **Unisys Corp.** under which the two firms will sell RTI's Ingres relational database management system with Unisys' U series of Unix-based processors.

Separately, RTI said Ingres runs on the Intel Corp. 80486 microprocessor under Unix. It also said it will work with **Corollary, Inc.** in Irvine, Calif., to port Ingres to multiprocessor 80386 and 80486 Unix environments. The two firms signed a joint marketing and engineering agreement to optimize Ingres for Corollary's 386/SMP (symmetrical multiprocessing) operating system, a multiprocessing version of Unix based on The Santa Cruz Operation's Xenix System V and SCO Unix System V/386.

E-KE Ltd. in Dublin, Ohio, an affiliate of the Battelle Memorial Institute in Columbus, Ohio, said it is forming a consortium of financial institutions to develop expert systems. The consortium will be called Hi-Fi Expert Systems. The goal is for several participants to share the cost of developing an artificial intelligence application, thus lowering the cost of an AI module for each participant.

AT&T said it has introduced a royalty policy that will make it less expensive for college and university students to gain experience in object-oriented programming. AT&T said degree-granting institutions can make and distribute binary copies of AT&T's C++ Language System Release 2.0 to students and faculty for $25 per copy. AT&T said it will continue licensing source code for $300 per CPU with no charge to institutions to make copies of the code, provided the copies are put to noncommercial use.

Unisys stays in training for role in Commonwealth Games

BY ELLIS BOOKER
CW STAFF

BLUE BELL, Pa. — When the starter pistols fire at the Commonwealth Games in January, it will be the culmination of five years of training for Unisys Corp.

As an official sponsor and the exclusive supplier of information systems technology at the 1990 Commonwealth Games in New Zealand, Unisys will provide computing power to an estimated 20,000 athletes, volunteers, press and VIPs expected to attend the event in Auckland. Unisys plans to provide the equivalent of $5 million worth of services and hardware leasing to the event.

In 1930, the first Commonwealth Games attracted athletes from 11 nations for its 10 sporting events; the XIVth Games, scheduled to open January 23, will see at least 50 countries competing in 10 sports. Some 58 broadcasting companies will beam the Games to an audience of 2.5 billion worldwide.

Unisys has shipped two A17F mainframes (one will be used as a backup) and 600 terminals to New Zealand. The A17F will be the muscle behind Sports Results and Information Network (Sprint), an integrated database system Unisys created for the project and built around Unisys' DMSII database management system.

According to project director Geoff Lawrie, the major components of Sprint's code were built beginning last year by a group of 12 people at Unisys' Complex Systems Division in Philadelphia.

Sprint will manage electronic mail, profiles of athletes, electronic bulletin boards and even the sensors that clock the athletes' times. The distributed network will use the Unisys BNA architecture. All of Sprint's applications were written in Linc, Unisys' fourth-generation language.

The primary A17F mainframe with 144M bytes of memory will run Unisys' MCP operating system and will feature a "mirror disk" containing a duplicate of the central database.

Athletes, press officials and other members of what Unisys calls the "Games family" will access Sprint from the 600 terminals, which will be Unisys BTOS series workstations placed throughout Auckland.

"Using intelligent terminals masks the vagaries of the mainframe system," explained Lawrie, who noted that most of the visitors to the Games will arrive a day or two in advance and will not have much time for instruction.

Lawrie described the Sprint user interface "as going beyond user-friendly. . . . It's user-benevolent."

Among other functions, the intelligent terminals will automate users' log-ons to the central computer and keep track of their security level — and so present only those menus and options that fit a particular security clearance. In addition, the integrated system will manage physical security of attendees in and out of the 16 sports venues.

Lawrie said he expects 100,000 official results transactions alone during the Games, although "the total number of results inquiries and other transactions will far exceed that volume," he said.

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Gibson

CONTINUED FROM PAGE 25

and the third-party DBMS vendors were not worried either. They sold their DBMSs — mainly on DEC systems in the midrange.

So the real culprit, if you take the DBMS vendors' side, is the AS/400. Unfortunately, IBM's position is virtually unassailable. You don't have to watch Judge Wapner every day to know that when something is being done and no one complains, it becomes, in effect, condoned and accepted. By allowing the System/38 to exist unperturbed for nearly a decade, the vendors said, in effect, "It's fine with us."

By attacking the AS/400 now, the software vendors are attacking not a violation of principle but a product's success. Seems cowardly, doesn't it?

Adapso could have more success going after DEC, because DEC's RDB and VMS and an Ingres-based RDBMS and Ultrix were once separate. The vendors can claim that a market for their products existed and that DEC is taking that market away.

DEC's argument — a strong one — is that it needs to do what it is doing for its own competitive reasons: to counter the AS/400 and thus to benefit users by offering them a competitive alternative. It would be quite unfair to force DEC to unbundle while not forcing IBM to do the same. And it will be virtually impossible to force IBM to separate the RDBMS from the AS/400's operating system.

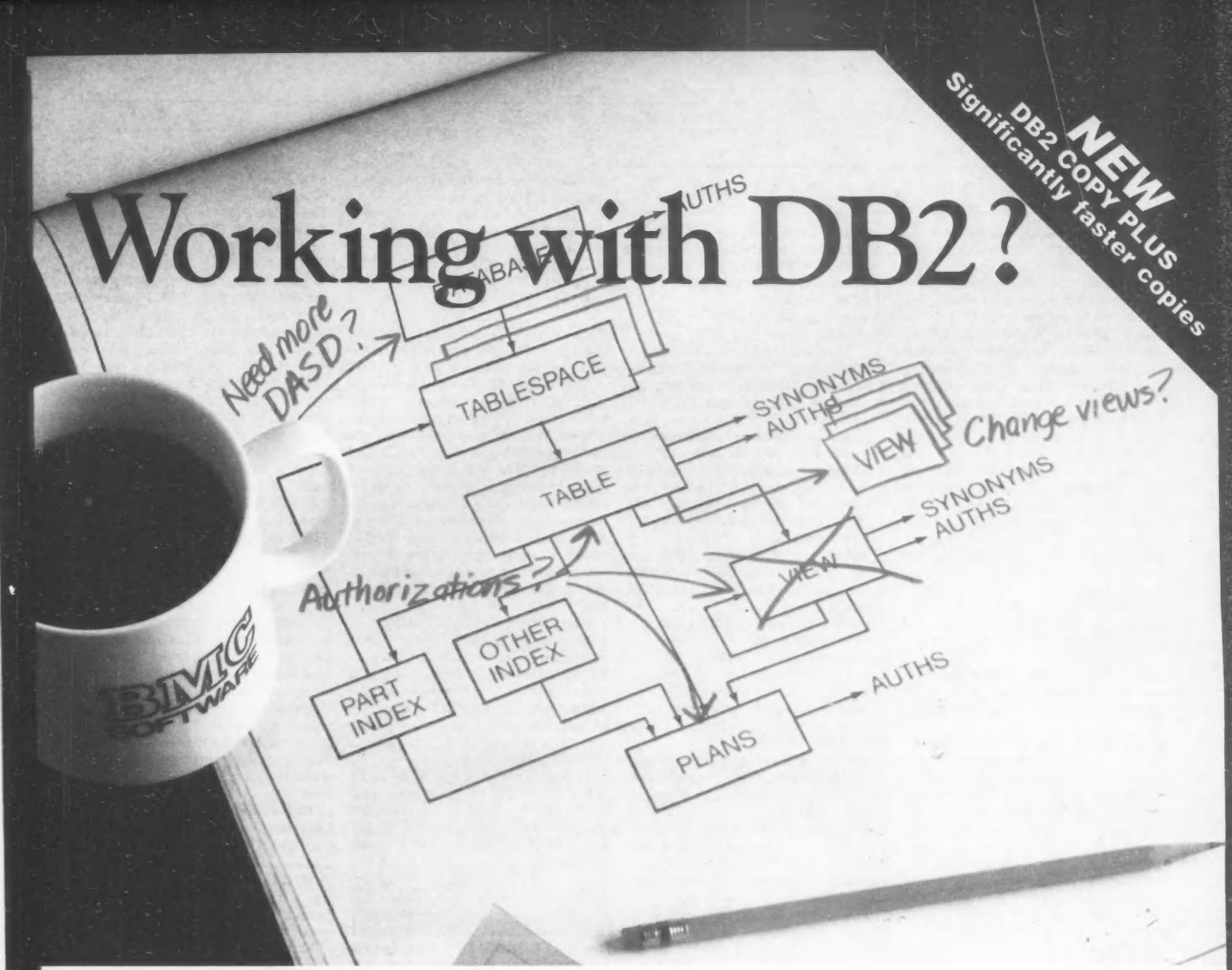
In addition, many experts say that what IBM did with the System/38 and later with the AS/400 is only in the natural order of computing's evolution. Since operating systems began, more and more has been added to them. Now RDBMSs are being added. That's evolution, not illegality.

Adapso chose to work on DEC first, because DEC is relatively weaker than IBM. Not only is it smaller, but it also has no history — unlike IBM — of waging protracted antitrust battles.

Further, the precedent of bundling, although it was mentioned in the 1969 antitrust filings against IBM, has never been proven illegal anyway. When the government's antitrust suit against IBM was dropped in 1982, the plug was pulled on further similar actions.

Adapso had better throw in the towel and apply its energies to helping members compete in a new environment. Twenty years is a long time to begin with. It is forever in the history of computing.

Gibson is *Computerworld's* senior editor, software.



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NEW PRODUCTS — SYSTEMS

Processors

Burr-Brown Corp. has introduced two digital signal-processing boards for Motorola, Inc.'s VMEbus. The ZPB3201 is said to use a single 25-MHz AT&T WE DSP32-160 floating-point processor with 64K bytes of static random-access memory and buffered serial I/O ports that are capable of receiving and transmitting data at 10M bit/sec. The ZPB3202 reportedly provides increased power with two of the processors.

Data may be transferred to and from either board by the VME parallel port or the serial bus, and both are in standard 6U VME formats, the vendor said.

Single-quantity pricing is $2,995 for the ZPB3201 and $4,495 for the ZPB3202.

Burr-Brown
P.O. Box 11400
Tucson, Ariz. 85734
602-746-1111

Scan-Optics, Inc. has announced a line of modular and upwardly compatible computer systems for the Pick operating system.

The Sabre series is reportedly Motorola, Inc. 68000- or 68020-based and includes desktop, tower and low-boy enclosures designed to support four to 128 users in a multiuser, multitasking environment. The computers are said to be equipped with the Pick operating system and word processing, spreadsheet and graphics software. According to Scan-Optics, the Sabre computers can interface with IBM Personal Computers or compatibles. Prices start at $11,850.

Scan-Optics
P.O. Box 19602
17021 Von Karman Ave.
Irvine, Calif. 92713-9602
714-863-7580

MAI Basic Four, Inc. has added an entry-level model to its Advanced Series line of high-speed CPUs.

The Advanced Series 20 is reportedly built on a 32-bit multiprocessor and supports up to two 5¼-in. small computer systems interface disks for a maximum of 1.4G bytes of memory.

It can support up to 52 terminals, connect to various tape systems and has a main memory capacity that ranges from 4M to 12M bytes, the vendor said.

Prices start at approximately $35,000 with a 12-month warranty.

MAI Basic Four
14101 Myford Road
Tustin, Calif. 92680-7065
714-731-5100

Data storage

Applied Digital Data Systems, Inc. has announced a disk-drive subsystem with expanded disk-storage capacity that was designed for use on its Mentor 6000 Models 4, 6 and 8.

Called the Mentor 6000 DSS4, the disk subsystem with small computer systems interface technology can accommodate up to eight 5¼-in., 380M-byte disk drives and provide a maximum storage capacity of 3G bytes with an average access time of 16 msec, according to the vendor.

The system is available immediately. The price of a base DSS4 subsystem with one 380M-byte disk drive is $20,000, which includes a first-year warranty when purchased with a Mentor 6000 system.

Applied Digital Data Systems
100 Marcus Blvd.
Hauppauge, N.Y. 11788
516-231-5400

Add-in memory for the IBM Application System/400 Model B-70 has been announced by American International Devices, Inc.

The AI/400 Uniboard reportedly uses the same basic board for 4M-, 8M- and 16M-byte configurations and is the same universal board used in AS/400 Models B-30 through B-60, providing users with memory upgradability as their AS/400 models are upgraded.

Available immediately, pricing for the Uniboard is $4,500 for 4M bytes, $9,000 for 8M bytes and $18,000 for 16M bytes of memory.

American International Devices
12540 Beatrice St.
Los Angeles, Calif. 90066
213-305-8161

Mid-Range Information Systems (MIS) has announced a tape backup system for IBM System/36 users.

The Streamer/36 system reportedly offers 150M bytes of data storage on one ¼-in. tape cartridge that can be transferred in as little as 35 min from disk to tape at a rate of up to 5.22M byte/min. According to MIS, the system comes with its own utility and tape management software and can operate in an unattended, automated mode.

The system is currently priced at $1,995.

MIS
Suite 110
1720 E. Garry Ave.
Santa Ana, Calif. 92705
714-757-1195

I/O devices

Taneum Computer Products has announced price reductions on Digital Equipment Corp.-compatible line printers.

Taneum's matrix printers reportedly emulate the DEC LG01 and offer letter-quality printing; compressed printing at 13.3, 16.7 or 20 char./in.; business graphics; bar code and a 255-char. multinational character set.

The 800 line/min printer, called the TCP 660, now costs $7,880, while the 1,200 line/min TCP 690 sells for $10,880.

Taneum Computer Products
203 S.W. 41st St.
Building 9
Renton, Wash. 98055
206-251-0711

GTCO Corp. has announced Sketchmaster, a graphic digitizer with 1,000 point/in. resolution.

The product is reportedly powered by the RS-232C port of the host computer rather than through a dedicated internal or external power supply. According to GTCO, the digitizer is available in two active area sizes: 11.7 by 11.7 in. and 12 by 18 in. It is said to include a tablet, a four-button cursor, an interface cable, a nine- to 25-pin adapter and a manual. Customers who mail in their registration card will receive a stylus directly from the factory, the company said.

The 11.7 by 11.7-in. size is priced at $449, and the larger size costs $699.

GTCO
7125 Riverwood Drive
Columbia, Md. 21046
301-381-6688

Memorex Telex Corp. has announced two displays for the IBM System/38 and Application System/400 market.

The 14-in., 1476/G Monochrome Display Station reportedly supports five keyboard types, has a multivendor printer port and is available in green or amber. Available since August, it costs $1,185.

The 1197F2 Color Display Station is said to be a seven-color display with 132-column support. The station supports three concurrent sessions (one host display and two host-addressable printer sessions), includes local screen printing with a print trim feature and features a multivendor printer port, the company said.

The unit sells for $1,895 and has been available since August.

Memorex Telex
6422 E. 41st St.
Box 1526
Tulsa, Okla. 74101
918-627-2333



The GR11-3K60 *UPS can operate from tactical field generators.*

Power supplies

Nova Electric, Inc. has extended its Galaxy family of 19-in., rack-mounted, uninterruptible power supply systems (UPS). Model GR11-3K60, a single-phase UPS for tactical applications, operates from an input voltage of 120VAC over an input frequency range of 45 to 65 Hz and has single-phase output fixed at 120VAC and 60 Hz, the vendor said.

The system reportedly operates from local utility power or from tactical field generators and will support computers, communications equipment and radar and test equipment. It meets the requirements of MIL-STD-810 and MIL-STD-1399 standards. The price in 10-piece quantities is $5,295.

Nova Electric
263 Hillside Ave.
Nutley, N.J. 07110
201-661-3434

Square D Co. has released the Topaz Powermaker Mini uninterruptible power supply (UPS) for most midrange computers. The on-line UPS system was designed for international power applications and provides protection against electrical noise, voltage spikes, sags, surges, brownouts and blackouts, the vendor said. It is said to offer multiple input and output voltages of 120, 208, 220, 230 or 240VAC at either 50 or 60 Hz.

The product is available in three models: 3, 5 and 10 kVA, which cost $6,150, $9,450 and $14,900, respectively.

Square D
Executive Plaza
Palantine, Ill. 60067
312-397-2600

Emerson Electric Co.'s Computer Power Division has introduced a 1.5 kVA on-line uninterruptible power supply (UPS).

The AP115 was reportedly designed for multiuser computers, local-area networks and clustered computer systems. The UPS is available in two models: a 10-min backup, 120-V, 60-Hz battery version that costs $3,800 and a 25-min backup unit that sells for $4,000.

The product reportedly requires no special wiring or installation procedures.

Emerson Electric
P.O. Box 1679
Santa Ana, Calif. 92702
714-545-5581

A series of electronic uninterruptible power supply systems (UPS) has been introduced by Sola, a unit of General Signal.

The 57 series units incorporate an isolation transformer positioned upstream of the bypass switch to protect against line noise, spikes and surges when operating in bypass mode, the company said. Each UPS reportedly can handle a 110% continuous overload during normal inverter operation. Available in 5-, 8-, and 10-kVA outputs, the units are priced from $9,640 to $15,200.

Sola
1717 Busse Road
Elk Grove Village, Ill. 60007
800-243-8160

Robotics

Hudson Robotics, Inc. has introduced a robotic work cell for dispensing precise quantities of powder automatically.

According to the company, the system uses a Mitsubishi Electric Corp. RV-M1 robot interfaced to a Hierath and Andrews Corp. ISO-G powder dispenser. The work cell reportedly can automatically load and unload vials, bottles, cartridges or other containers and features five axes of movement, 2 7/10-pound payload capacity and a movement speed of 41 in./sec.

The price for the robot is listed at $15,300.

Hudson Robotics
44 Commerce St.
Springfield, N.J. 07081
201-376-7400

Maintenance equipment

Computer-Link Corp. has announced Model 3800-6, a tape cleaner and evaluator that reportedly can operate with tape densities from 800 to 6.3K bit/in. The product is said to be able to remove debris and loose oxide particles that can cause data errors and then evaluate the tape's data-handling ability with user-set test criteria.

The system has a noise-record detection capability and is able to isolate subsections of the tape that are unusable and that can be stripped, allowing otherwise defective tapes to be used, the vendor said. The unit can clean at a 200 in./sec. rate and sells for $18,350.

Computer-Link
3 Lopez Road
Wilmington, Mass. 01887
508-657-8820

NEW PRODUCTS — SOFTWARE

Applications packages

Systonetics, Inc. has announced Release 5.5 of Ezpert, a project graphics software system for IBM computers.

Added features include network options with a color node display, regional zone labeling capabilities and a bar-chart option with title format control, the vendor said.

Customers currently on a support services contract may receive the Release 5.5 upgrade at no additional charge; customers not currently on a support contract will be charged $11,000 for the basic upgrade.

Systonetics
801 E. Chapman Ave.
Fullerton, Calif. 92631
714-680-0910

The Bridge, Inc. has enhanced Trak, its project management software package for IBM and IBM-compatible mainframe users.

Version 3.2 of the on-line software can operate with CICS or TSO, the company said. The software features several additional functions such as selective comment reporting and the ability to edit comments using text-editing commands. Trak 3.2 costs from $14,500 for DOS/VSE versions and from $25,000 for MVS versions. Lease terms start at $515 per month.

The Bridge
199 California Drive
Millbrae, Calif. 94030
800-423-4303

Apollo Computer, Inc. has introduced the Knowledge Broker, a software package designed to deliver and retrieve information on-line, the company said.

The program can be used for various applications such as technical publishing, mechanical computer-aided design and imaging, according to the vendor. Features reportedly include hypertext links for navigating through data nonsequentially. The software costs $550 per workstation, and an introductory package, including eight electronic manuals, is available for $600.

Apollo Computer
330 Billerica Road
Chelmsford, Mass. 01824
508-256-6600

On-line management of text and images is now available through software from Data Retrieval Corp.

Textbook Online Manuals lets users store, update, search and retrieve reference information normally kept in such paper or book formats as manuals and documentation, the vendor said.

Reportedly, after text and images have been entered into a database via a scanner or word processor, the user can search and retrieve information by any word or phrase.

Textbook is said to run on all Digital Equipment Corp. VAX/VMS and IBM MVS/CICS systems. Prices start at $9,300 for nongraphics applications and at $114,925 for graphics applications.

Data Retrieval Corp.
8989 N. Deerwood Drive
Milwaukee, Wis. 53223
414-355-5900

Napersoft, Inc. has announced a callable spell-checking software product for IBM mainframes.

Naper-Spell reportedly allows programmers to provide end users with spell-checking capabilities. A series of callable batch and CICS subroutines that run on IBM mainframe or plug-compatible computers, the software can be called by any Cobol, PL/I or assembler program, the vendor said. A perpetual license costs between $3,000 and $18,000.

Napersoft
1 Energy Center
Naperville, Ill. 60540
312-420-1515

Precision Visuals, Inc. has released an interactive graphics software package for analyzing and visualizing technical data on Digital Equipment Corp.'s VAX/VMS systems.

PV-Wave is especially useful for scientists and researchers who work with substantial amounts of multidimensional data and need to navigate large data sets quickly, the vendor said. Pricing starts at $3,350 for the DEC Vaxstation 2000, according to the firm.

A version for Sun Microsystems, Inc. workstations has been available since the first quarter of 1989.

Precision Visuals
6260 Lookout Road
Boulder, Colo. 80301
303-530-9000

SAS Institute, Inc. has announced performance evaluation software tools for Digital Equipment Corp.'s VMS environment.

Called Sas/Cpe, the software allows system analysts to collect, analyze and report current usage as well as to anticipate changing requirements, the company said.

The product is a component of the Sas system, an integrated software system for data management, analysis and presentation.

The first-year license fee for Sas/Cpe ranges from $850 to $2,900.

Sas Institute
Sas Circle
Box 8000
Cary, N.C. 27512
919-467-8000



How UDS squeezes more out of the V.32 standard

Believe it! In the hands of UDS engineers, the V.32 standard means a lot more than 9600 bps, full-duplex.

Every UDS V.32 is fully compliant with the CCITT recommendation, but that's only the beginning. Model V.3225, the latest in the UDS V.32 family, offers *lots* of extra features.

First of all, there's MNP level 5, the data compression/error control technique that increases data throughput by as much as a 2:1 ratio. In other words, a UDS V.3225 can give you full-duplex error-free communication at 19.2 kbps!

When your dedicated line goes down, V.3225 is the ideal dial back-up solution. It even checks the dead line periodically and switches back to it as soon as it's available.

Then there's V.22 *bis* operation; if your V.3225 receives a call at 2400 bps, it automatically drops to that speed, and full-duplex communication goes on.

Got a real data density problem? The card you get in your free-standing V.3225 can be plugged directly into the Universal Data Shelf,™ giving you as many as 16 channels in a standard 19- or 23-inch equipment rack.

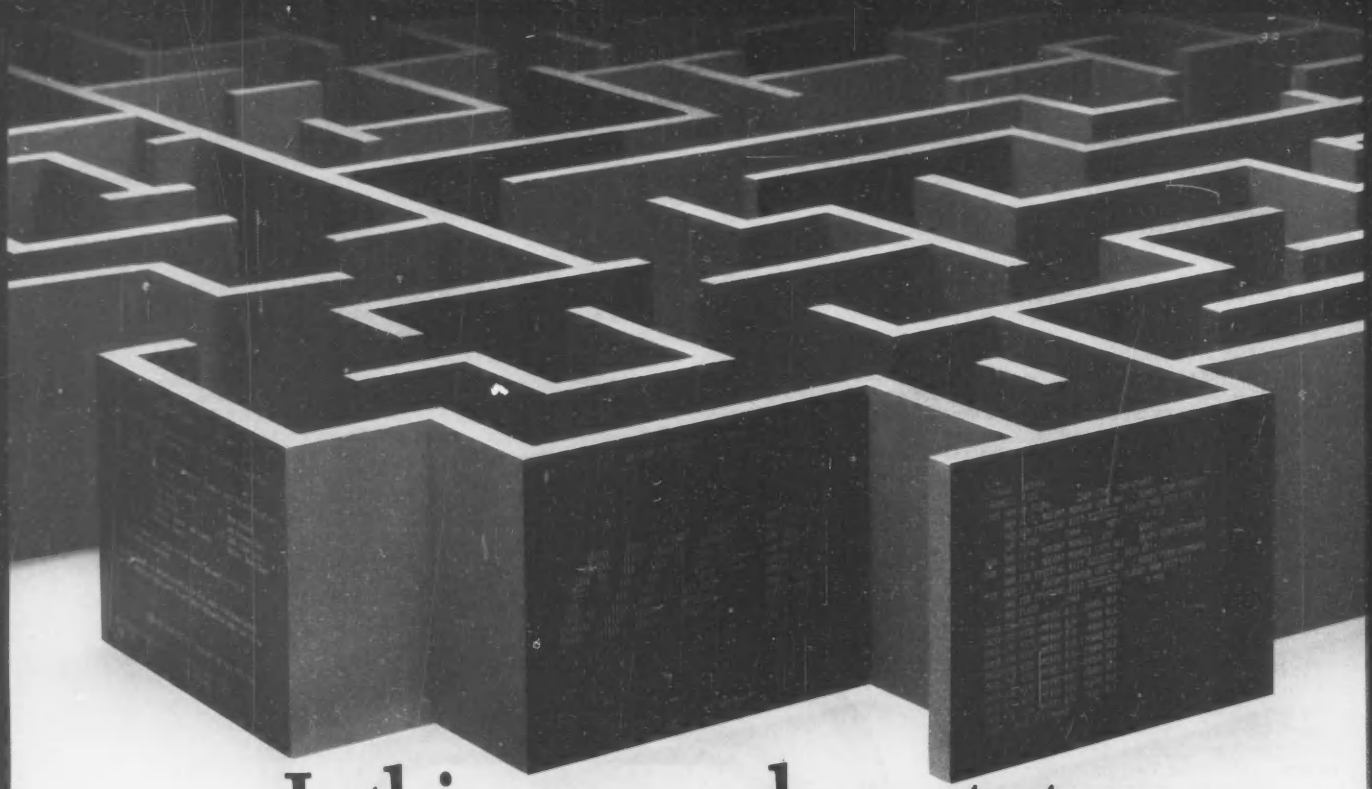
To learn how the V.3225 can squeeze more from your datacomm system, contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Telephone 205/721-8000; FAX 205/830-5657.



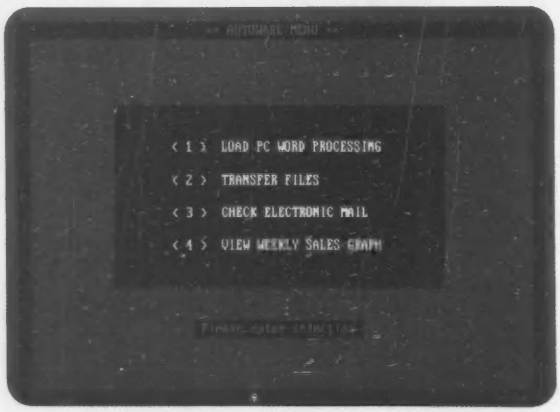
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Universal Data Systems
A MOTOROLA INC.

Created by Daymon/Hall, Inc., Winter Park, Florida



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Utilities

An automated computer operator, job scheduler and batch management system for the IBM Application System/400 and System/38 has been upgraded by Help/Systems, Inc.

Robot Version 5.0 reportedly offers increased scheduling options, including a reactive feature that runs a job in reaction to particular events in the system. Additions are said to include a job control display that gives information on each batch job run and 12 operations automation utilities, including a library list management system. The System/38 version is priced at $2,800. Upgrading costs $500, including one year of maintenance.

Help/Systems
210 Baker Technology Plaza
6101 Baker Road
Minnetonka, Minn. 55345
612-933-0609

Software AG of North America, Inc. has released a session manager for VM environments that enables a terminal user to maintain simultaneous sessions with various virtual machines and switch between those sessions by using a single keystroke.

Menu-driven VM-Pass reportedly features windows display and control of simultaneous sessions as well as the capability of adding on-line Help systems to existing applications without changing them.

According to Software AG, an optimizing component reduces the data stream transmitted between the terminal and application through compression. Prices range from $2,500 to $31,200, depending on components and group-rate structure.

Software AG
11190 Sunrise Valley Drive
Reston, Va. 22091
703-860-5050

Axios Products, Inc. has upgraded its CICS performance software.

The Fetch products provide CICS program compression relief by monitoring the amount of dynamic storage area (DSA) available for program storage, the company said. A DSA monitor reportedly permits access to DSA usage information that helps the user determine efficient DSA parameters. A warm-start capability provides a rapid restart of Fetch.

Running under MVS/SP, XA, ESA and all releases of CICS including 2.1, Fetch sells for $12,000. Fetch/XA sells for $15,000.

Axios Products
1455 Veterans Highway
Hauppauge, N.Y. 11788-4836
516-348-1900

An operations troubleshooting tool for Unisys A series machines has been introduced by Datametrics Systems Corp.

Viewpoint is used to detect, diagnose and solve computer problems with response time, throughput and hardware failures, the vendor explained. The user can reportedly use the product to continuously monitor and control system resources, and an alarm system alerts the operator when performance or service levels are threatened.

Introductory prices on orders placed before November 6 range from $3,000 to $15,000, depending on configuration, the firm said.

Datametrics Systems
5270 Lyngate Court
Burke, Va. 22015
703-425-1006

Training

AI Ware, Inc. has announced a family of courses in expert systems and neural nets.

There is a one-day course on artificial intelligence designed for senior management at a price of $495, a two-day technical course for engineers and programmers priced at $995 and a customized course on knowledge engineering based on the user's needs, the firm said. For neural net applications, an introductory half-day course for managers is available for $295, and a customized two- to five-day technical course is available for scientists, engineers and researchers.

In addition, a half-day course that applies computer technologies to manufacturing is offered to managers for the price of $295.

AI Ware
11000 Cedar Ave.
Cleveland, Ohio 44106
216-421-2380

Compilers

Modular Computer Systems, Inc. has upgraded an Ada compiler system for the government market.

The Ada Compiler System reportedly supports mixed-language programming, allowing integration of Modular Computer or third-party products.

According to Modular Computer, programs developed using the system can use Fortran, C, Pascal or Modular Computer's General Language System (GLS) routines and GLS libraries.

The system is being implemented on Real/IX, Modular Computer's real-time AT&T Unix System V operating system, the company said.

Scheduled to be available in the first quarter of 1990, prices start at $22,000.

Modular Computer Systems
1650 W. McNab Road
P.O. Box 6099
Mailstop 230
Ft. Lauderdale, Fla. 33340
305-974-1380



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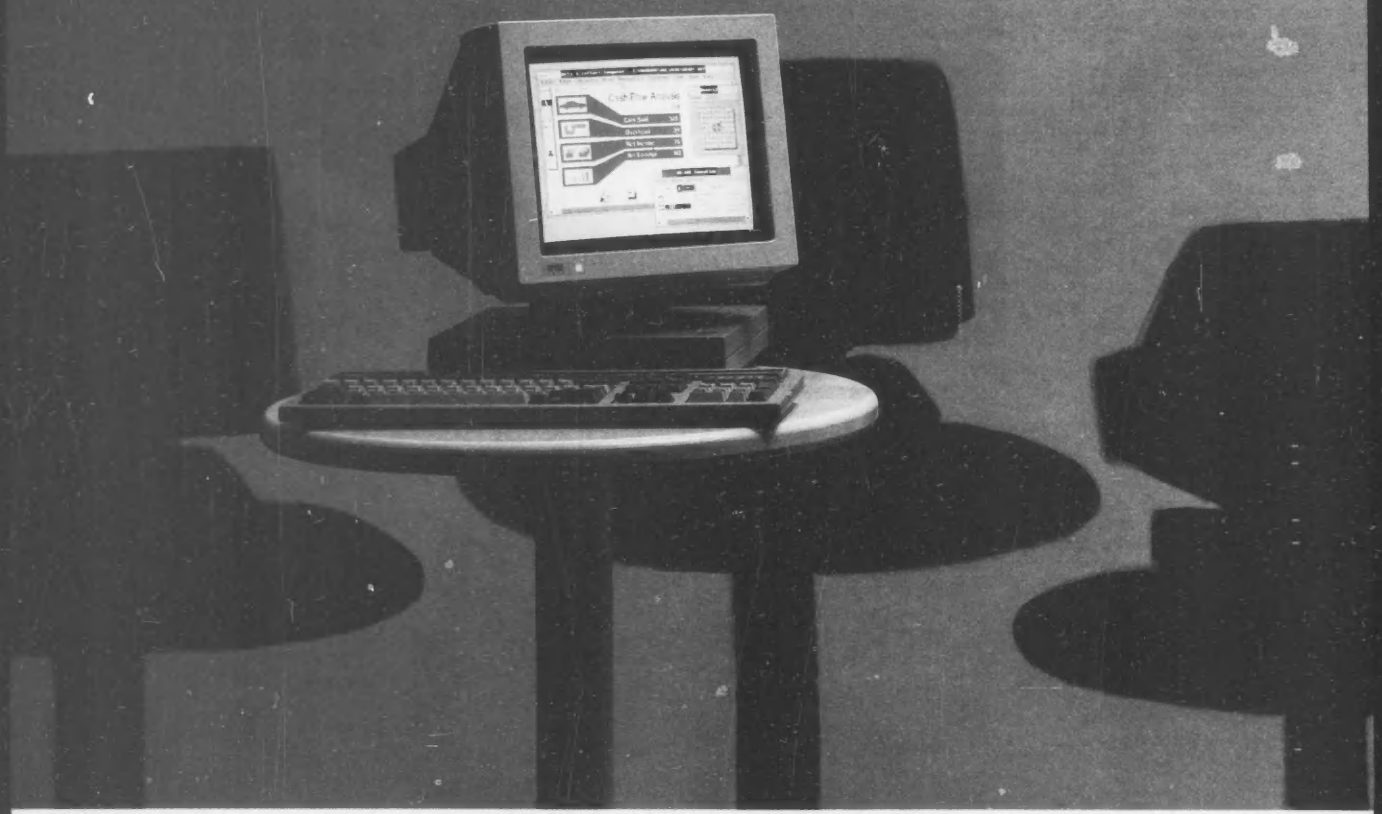
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And while The Networker puts PC capabilities on user's desks, it provides MIS management with data and software security. Users access disk storage over the network. There's no local storage — no removable disks.

The Wyse Networker fits comfortably on less than a square foot of desk space. Yet it comes loaded with a full megabyte of RAM and built-in VGA. Plus the flexibility to work with virtually any network, from 3Com and Novell to IBM Token Ring and Ethernet. Because it's modular, The Networker will adapt readily to other network environments, as well.

The Networker is also part of SystemWyse.™ So it links easily with powerful Wyse 286 or 386 file servers to create network solutions with compatibility and connectivity built in.

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WYSE

MICRO BITS

Tony Friscia

CIM-ply an influx



Personal computers and workstations are not attacking just the minicomputer's IS turf; it appears they are invading the manufacturing arena as well.

Advanced Manufacturing Research (AMR) estimates there are more than one million PCs installed on the plant floor. This will double within the next two to three years — representing a total hardware base worth more than $6 billion. What's more, workstation sales to the plant floor should easily top $200 million this year, the research firm said.

These devices, already de rigueur in Fortune 1,000 sites for computer-aided design and computer-aided software engineering applications, are being sponsored for new applications. Some Fortune 100 companies are hosting "Sun Days" to spotlight new capabilities. With the increasing power requirements of the plant floor user, it is clear that the advanced plant workstation market is energizing.

The PC's popularity has attracted a bevy of new applications for manufacturing. Industrial application vendors

Continued on page 49

Bailing out taxpayer assistance

BY MITCH BETTS
CW STAFF

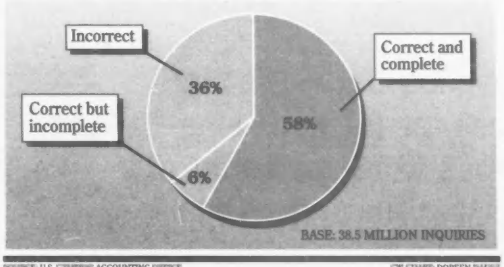
WASHINGTON, D.C. — The Internal Revenue Service is developing a personal computer-based expert system to see if it can fix an embarrassing problem that crops up year after year: IRS employees give the wrong answer to taxpayer questions 36% of the time.

The problem is that the 5,000 telephone "assistors" face a very challenging task, according to IRS officials. When someone calls on the toll-free taxpayer assistance line, assistors must either know the answer by heart or search through one of 159 IRS publications or 10 volumes of tax regulations.

In fiscal 1988, the assistors responded to 38.5 million telephone inquiries. On a typical day, an assistor will answer 150 taxpayer calls, including 53 callers with technical questions on tax law that could fall into any one of 139 different topics.

Oops!

In 1988 filing season, IRS taxpayer assistance employees provided wrong answers to more than one-third of the callers



SOURCE: U.S. GENERAL ACCOUNTING OFFICE — CW CHART: DOREEN BARRIE

Officials are hoping that, in the future, an expert system developed by the IRS Artificial Intelligence Lab will guide assistors through the process of answering taxpayer questions and yield a lot more correct answers. A prototype of the rules-based system, called the Taxpayer Service Assistant, will be tried out in the Boston office during the 1990 filing season.

IRS officials would not discuss the project in detail, but an article in the IRS Research Division's research bulletin provided some insights on the system's design. The article, by AI specialist Thomas J. Beckman, said the expert system provides the following advantages:

- It shifts the burden of knowing, remembering and reasoning about details of tax laws from the assistor to the computer.
- It accesses only the data relevant to the taxpayer's individual case.
- It embodies knowledge found in IRS publications.
- It reduces referral of taxpayer questions to specialists, allowing them to concentrate on the most complex questions.
- It serves as a training aid by helping assistors learn tax topics.

In the Boston test next year, the expert system is expected to

Continued on page 49

HP server plan seen as strategy shift

BY PATRICIA KEEFE
CW STAFF

Hewlett-Packard Co.'s shift in focus to personal computer-based file servers signals a major change in its midrange strategy and profit centers and also establishes trendsetting price/performance breaks for users, according to recent reports from The Sierra Group, Inc. and Prudential-Bache Securities, Inc.

While competitors struggle to reposition their minicomputers as cost-effective alternatives to PC-based servers, HP is busy embracing PC-based technologies where they make sense, according to Tempe, Ariz.-based Sierra's "Cost of Ownership" report — so much so that HP "is in the enviable position of having more demand than it originally anticipated in the strategic desktop area," concurred a research report from Prudential-Bache.

For entry-level work-group requirements, HP's approach builds on industry-standard PCs. The vendor's forthcoming OS/2 LAN Manager-based products and New Wave graphical user interface are expected to play major roles in this scenario, Sierra's report said.

Conversely, the HP 3000 reportedly is being steered toward user-intensive, volume-oriented environments.

This change in strategy dovetails with slowing growth in the higher margin minicomputer arena. Prudential-Bache estimated that excluding minis, HP's Unix- and PC-based computer groups may grow by about 55% in fiscal 1989 vs. an estimated 15% growth in the firm's commercial minicomputer group.

The net result of these shifts in tactics are per-user costs that are significantly lower than the solutions recommended by HP in 1988, Sierra claimed. Compared with the HP 3000 solutions recommended last year, savings range from 31.6% for a 16-user configuration to a 51.7% savings for 100 users, Sierra said. In the four-user category, the research

Continued on page 44

Inside

- What's on manufacturing firms' minds? Page 44.
- Microsoft concentrating on independents' efforts in OS/2 arena. Page 43.

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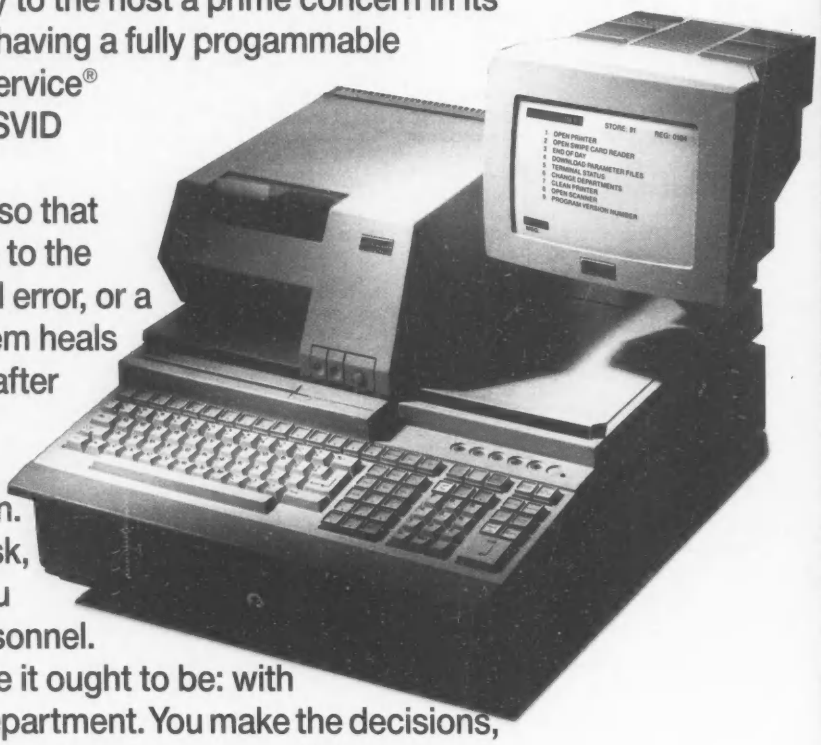
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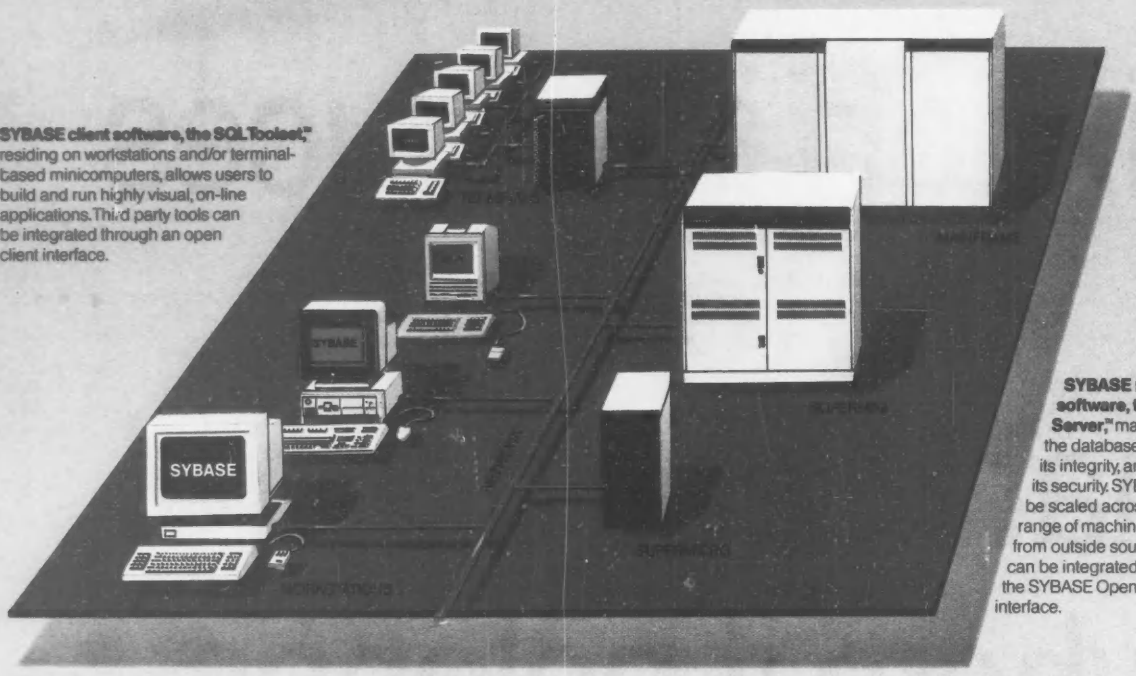
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It's a dog's life to Purdue vets

School hatches plan to save laboratory animal lives with computer study

ON SITE

BY RICHARD PASTORE
CW STAFF

WEST LAFAYETTE, Ind. — Animal-rights advocates have an unlikely ally in veterinary schools — computers. Purdue University's School of Veterinary Medicine is one of several institutions striving to reduce animal sacrifice by supplementing and eventually supplanting animal-based instruction with computer-based study.

"We want to replace the use of animals in education and teaching as much as possible," said Gordon Coppoc, program director and chief of veterinary physiology and pharmacology at Purdue.

"That means trying to create a computer system with which the students can dissect an animal, if you will, by pointing to a digitized part of the animal on screen and being able to manipulate it and see it from any view," he said.

Purdue is still several years and many dollars away from its ideal of digitized dissection, Coppoc admitted. But over the last two years, the program has made strides with homegrown image-based interactive programs that run on a diverse menagerie of machines linked by the National Science Foundation's NSFnet via Ethernet cards.

Currently, the school is storing images of whole and dissected animals on videodiscs. Introductory anatomy and physiology students use IBM's Infowindows software on an IBM Personal System/2 Model 30 to access the images for study instead of cutting open a specimen or straining over a fuzzy textbook photo.

There are drawbacks to traditional dissection other than the animal sacrifice.

"Dissections are tedious and slow; if you make a mistake and slice the wrong thing, you can't repair it," Coppoc said.

"The computer graphics alternative allows you to see the relationships of the parts from different perspectives instead of focusing on the drudgery of slicing up a stinky cadaver," he said.

Another current development is an image-based tutorial program running on two Sun Microsystems, Inc. Sun-3 workstations. The program depicts an image of a brain, highlights sections of the image and challenges anatomy and neurology students with questions on the sections' names, functions and interrelationships.

The brain program's developer, Jim Morrison, director of clinical computing and intelligent systems, wrote the software with Sun's Sunview and Suncore graphics packages. He described the program as "semi-intelligent" because it randomly creates a different set of questions each time it runs. The program also reacts to student responses, noting wrong answers and providing correct ones to the temporarily stumped.



Purdue's Morrison *gives workstation lesson*

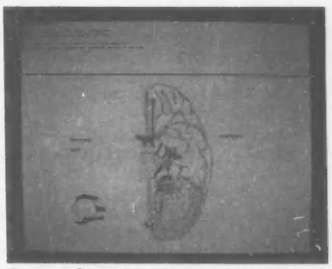
These systems are currently supplementary education tools, although each one of the school's 245 students is required to use the computers at some point. The ultimate goal is to make the computers integral to veterinary education, Coppoc said.

He did acknowledge, however, that digitized dissection could not completely replace real animal use in such settings as surgery class; students need to become accustomed to the feel of real tissues.

Purdue's short-term goal is to digitize animal images, including real-time moving images such as a running horse, and store them on compact disc/read-only memory devices. Students will then access and manipulate these images to get a better sense of how an animal appears and behaves from several perspectives, Coppoc said.

The school is installing a newly acquired Silicon Graphics, Inc. workstation to run the real-time image digitizing operation.

The time frame for future projects hinges on funding and cooperation among veterinary schools. Veterinary schools at Purdue, Michigan State, Auburn and North Carolina State universities as well as the University of California at Davis have shared videodiscs and software and will further such cooperation, Coppoc said.



Sun workstations *help teach cranial anatomy to veterinary students*

Main backers toot their OS/2 horn again

ANALYSIS

BY PATRICIA KEEFE
CW STAFF

REDMOND, Wash. — A disappointingly slow takeoff of OS/2, the so-called cornerstone of the next generation of desktop computing, has prompted differing reactions and tactics from its two head cheerleaders.

While IBM has vowed to make OS/2 support DOS applications better than DOS itself and to also bring its developers into closer contact with user needs [CW, Aug. 28], Microsoft Corp. prefers to spend its time rallying independent software developers around the OS/2 flagpole.

"OS/2 [growth so far] is not hugely out of line with our expectations, given that few Presentation Manager-based applications are shipping today," said Cameron D. Myhrvold, strategic marketing manager for Microsoft's Advanced OS/2 System Group. "We look forward to a time when major applications begin to ship, and people will say 'Aha, now I understand [the benefits of OS/2]."

Myhrvold said reports about IBM's recent statements concerning the extent to which DOS is entrenched in the user community "make IBM sound pessimistic." He suggested the two vendors' differing reactions may have a great deal to do with their individual expectations for OS/2.

"We understand what it takes to make OS/2 successful, and we will be successful," he said, noting that Microsoft's grand plan does not call for DOS to die in the fall of 1989. "We sold over 30 million units of DOS, and while DOS will continue to be a strong market, we think that the most sophisticated applications and systems will be based on OS/2."

In the meantime, Microsoft is working to increase compatibility between the two operating systems, he said. The first round of improvements will show up under OS/2 Standard Edition Version 1.2, slated to ship this quarter.

Continued on page 44

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Manufacturers demand PCs

BY ELLIS BOOKER
CW STAFF

CHICAGO — The purchase of personal computers and an interest in PC-to-host connectivity dominate the plans of manufacturing companies as they look toward 1990, according to a recent study by The Survey Center, Inc.

Some 97% of the respondents said they would purchase personal computer hardware, another 91% said PC software was on their purchase list, and 74% said they would be investigating computer-integrated manufacturing next year, according to the New Seabury, Mass., market research firm.

Surprisingly, more than half of the respondents agreed with the statement, "My company is behind the times in automated technology manufacturing."

Top management has become involved in computer purchasing decisions at manufacturers, according to the survey, which found that 64% of respondents in the "corporate management" category said they were involved in buying PC hardware. Information systems and design engineering professionals followed, with 53% and 37% saying they were involved in purchasing hardware.

Although microcomputers held the lion's share of the planned hardware purchases reported by the manufacturers, minis and mainframes were also listed. On average, these users expected to spend $110,600 in the next year on hardware and another $65,100 on software.

Respondents demonstrated a strong interest in PC-to-host integration; 62% said they thought their companies needed to concentrate more on PC integration, and 88% said their company would likely use more PC technology in the future.

About 27% of the 3,800 design engineers, IS managers, general corporate managers and others contacted responded to the questionnaire. The survey was prepared for the May 1990 Advanced Manufacturing Systems Conference and Exposition in Chicago.

OS/2

CONTINUED FROM PAGE 43

Of course, Microsoft has not exactly been complacent, even if Myhrvold's comments give the impression that the PC software giant is quietly biding its time.

The company did commission a survey of industry analysts and trade press editors a few months back, asking those polled what they thought was holding OS/2 back and what needed to be done about it.

What came out of that effort is unclear. After pointing out that the survey did not include user input, Myhrvold insisted it has not resulted in any changes in Microsoft's OS/2 strategy.

"Certainly there are some factors in the OS/2 market that need to happen before OS/2 really takes off, and we have always recognized those," Myhrvold said. The key factor, he repeated, is applications. Another issue, he conceded, is the cost of memory — OS/2 needs lots of it.

Myhrvold claimed that users base their purchasing decisions around application needs rather than operating systems. "[Therefore] our efforts here at Microsoft revolve around getting greater applications support for OS/2," he explained.

The payoff for users will begin with a groundswell of OS/2-related announcements in the fourth quarter, particularly at Comdex/Fall '89; Myhrvold predicted between 40 and 50 prototype and actual applications will be demonstrated there. These packages will provide better productivity, more functionality and faster performance than DOS-based versions, justifying the move to OS/2, he claimed.

"We have a strong story in terms of the diversity and quality of the OS/2 applications under development. We have the Softsel Hotlist, and all the major vendors are moving their applications over to OS/2," he said, citing as examples Lotus Development Corp.'s 1-2-3 G, IBM's Officevision, Aldus Corp.'s Pagemaker and Wordperfect Corp.'s Wordperfect.

"We're on the thin edge of the wedge," the bottom of the ramp-up for OS/2 sales, he said.

Hewlett-Packard

CONTINUED FROM PAGE 39

firm estimated that a Vectra-based file server solution is half the price of last year's minicomputer alternative.

Prudential-Bache suggested that HP's strong standing on the desktop — principally via low-end workstations and PCs — and personal peripheral markets may make it willing to cut prices if the pricing environment becomes too aggressive.

Of course for HP, this all translates into lower gross margins at a time when Wall Street would like to see the company push down its operating margins.

There are also savings to be had on the support side of HP, where PC software is playing a role in improved software maintenance strategies. Last year, Sierra bashed HP for "nickel-and-diming" users to death via its software support policies. Since then, HP has revamped its pricing policies to serve a distributed environment better, Sierra said. The decision to offer PC-based software supported by a single CPU-related charge is seen as intrinsic to HP's new pricing programs.

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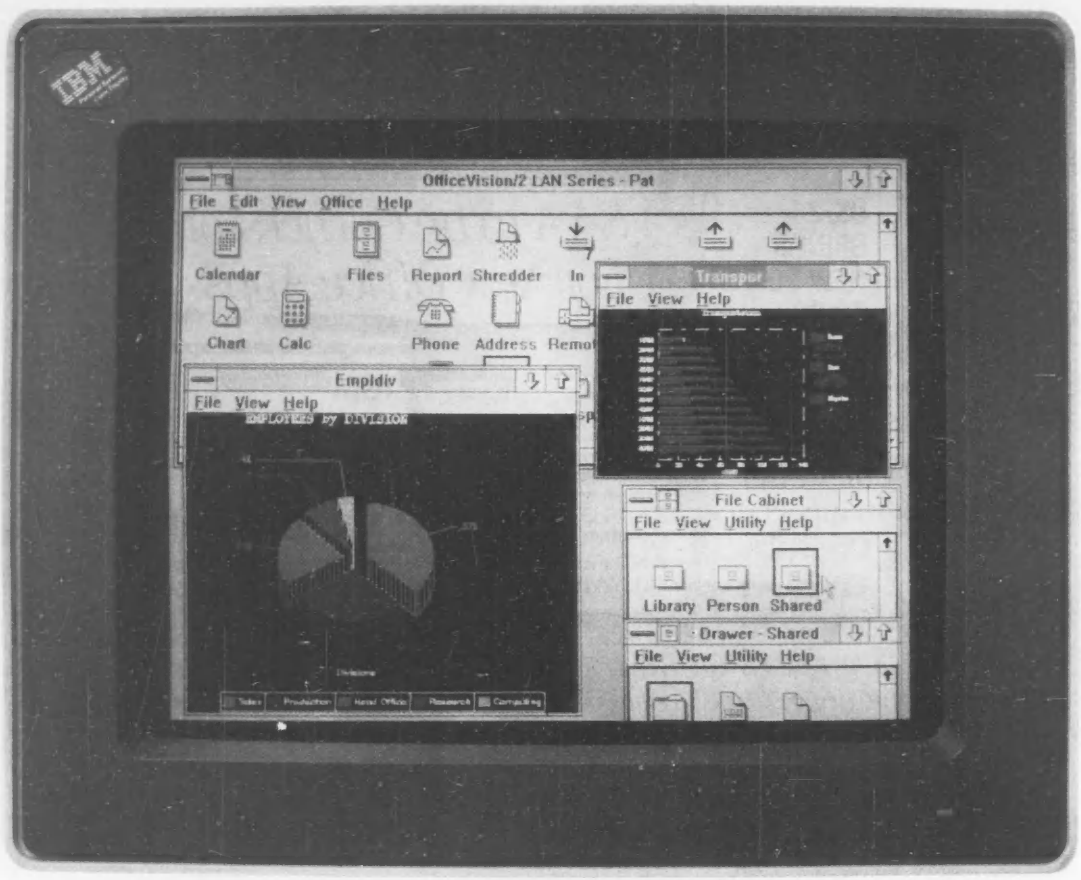
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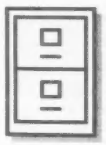
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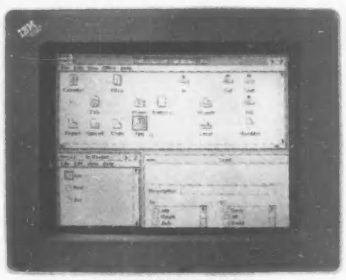
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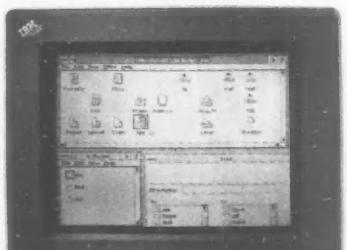
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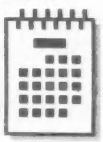
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SPSS for OS/2 escapes DOS memory limits

BY PATRICIA KEEFE
CW STAFF

CHICAGO — SPSS, Inc., a developer of statistical data analysis software, will ship SPSS for OS/2 next month. The multitasking software runs under Presentation Manager and provides access to data located in IBM's Database Manager.

But what appealed to the Cook County Assessor's office was the ability to have median files comprising 20,000 records (up to 1M byte) and speed comparable to the DOS version despite OS/2's size, said programmer/analyst James Harmening. "Not experiencing degradation in speed was a big plus," he added.

SPSS for OS/2 succeeds SPSS/PC+, an MS-DOS version, enabling users to make an end run around DOS' memory and variable limits while taking advantage of the functionality of SPSS' mainframe-based statistical software on a personal computer.

The OS/2 version costs $995 and reportedly boosts the number of variables supported in a file from 500 under DOS to roughly 32,000.

The Cook County Assessor's office does residential mass appraisals using multiple linear aggression. It ran into problems using SPSS/PC+: "We use medians a lot, and that takes a lot of memory, so when we'd hit [MS-DOS'] 640K-[byte] barrier, the reports would bomb," Harmening explained.

Redesigned menu system

The OS/2 program uses a redesigned version of the SPSS/PC+ menu system. Features include more than 50 statistical procedures, a report-writing facility, statistical routines, data and file management facilities and a programming language said to enable users to create customized routines or macros.

"Putting a programming language into the hands of [nontechnical] analysts provides us with a lot of flexibility," Harmening said. This capability allows users to change and enhance PC-based reports quickly, he said.

Add-on options, priced at $495 each, provide increased performance in specialized areas. SPSS Advanced Statistics includes statistical procedures; SPSS Tables is said to allow users to create publication-ready stub and banner tables; and SPSS Trends performs forecasting and time series analysis.

SPSS for OS/2 runs on IBM Personal Computer AT and Personal System/2 computers and compatibles under OS/2. It requires 4M bytes of random-access memory and a 20M-byte hard disk. A mouse and math coprocessor are recommended.

MICRO BITS

Deskpro series sales blast off

Sales of **Compaq Computer Corp.'s** Deskpro series are on the move. In its July survey of computer retail sales of individual computer models, market tracker Storeboard, Inc. said that the Deskpro 286e climbed from eighth place into third, while the Deskpro 386/S climbed from seventh place into fourth. The top two spots are held respectively by IBM's Personal System/2 Model 50Z and PS/2 Model 30/386.

IBM's Academic Information Systems organization said it will pre-install HDC Computer Corp.'s Windows Express, Windows Manager and Windows Color software on Personal System/2s as part of a fall and holiday promotion on systems sold to higher-education institutions.

All is forgiven, according to **ABC Development Systems.** The Minneapolis software publisher has kicked off a limited-term amnesty program for violators of its copyrights in the Workstation Basic business programming environment software. Dealers and end users have until Oct. 1 to purchase a valid, licensed software package without fear of being slapped with a lawsuit, according to the company.

For $39.95, personal computer users can purchase software from **Invisible Software, Inc.** that is said to extend DOS memory as high as 736K bytes in machines equipped with Chips and Technologies, Inc.'s shadow random-access memory (RAM). This includes the estimated 80% of Intel Corp. 80286 and 386 computers said to use Chips and Technologies' NEAT and AT/386 chip sets. Invisible RAM also enables loading of as much as 224K bytes of a terminate-and-stay-resident program into shadow RAM.

After only six months, **Informix Corp.'s** Wingz, the Macintosh spreadsheet program, is taking off with the U.S. Air Force as part of a $164 million contract awarded last month to Honeywell Federal Systems, Inc. The U.S. Department of Defense is launching a five-year Worldwide Military Command and Control ADP Modernization program that includes Apple Computer, Inc.'s Macintosh II computers running A/UX, Apple's Unix port.

Tom bought Hewlett-Packard long



Friscia

CONTINUED FROM PAGE 39

such as Indelec and Intellution expect to see their installed base double or triple this year.

Interviews with Lotus, Oracle and other office software vendors reveal that their spreadsheet and database products are becoming core enablers on the plant floor. In fact, many hardware and software suppliers are selling applications built on these enablers, creating a "fourth-party" market.

Workstations have encountered somewhat slower acceptance, primarily because of their higher price — stripped-down models hover around $5,000 to $8,000 vs. $1,000 to $2,000 for bare-bones PCs — and sparse plant floor applications — for example, cell and machine control, simulation, process planning, quality control and manufacturing document management.

Price will remain a key differential between PCs and workstations at the very low end, but the distinction blurs as both cross into the other's domain. For example, many PCs run MS-DOS, OS/2 and/or Unix (or a variant).

Unix workstations typically support DOS coprocessors or emulation software. Many PC software developers who outgrew DOS are either migrating to Unix or have already done so. But in the near term, the choice of one device over another will be based solely on the availability of applications.

By 1991, the leading vendors will offer a layer between the operating system and the user in an effort to provide technology-independent solutions. From the end user's perspective, all interaction with the computer or application will be through this layer — primarily through the graphical user interface. There are a wide range of interface products available or under development, including Decwindows, HP's New Wave, AT&T's Open Look, IBM's Presentation Manager and Motorola Computer X's Human Interface.

If a standard is to emerge, AMR believes it will be the Open Software Foundation's Motif, which is based on Decwindows and New Wave. Support will probably be fuzzy. Developers supporting it will offer proprietary extensions, particularly in the area of tools and accessories. Those who don't will claim to be Motif-like or will pledge to support it in the future.

It is important to note that the user interface is only one component. By itself, it does not promote integration between applications.

However, this lone component provides a major marketing opportunity. As many Fortune 500 manufacturers have learned, the problem with technology is that it may be just right for the advanced manufacturing group that specified or piloted it, but it may be too sophisticated for the actual end user.

The solution — and hence opportunity — here is to create a nonthreatening system with an intuitive user interface and graphical display that bridges to "the old way" of doing things.

AMR has developed a conceptual model for a cell integration station (CIS). CIS is a multifunction hardware and software platform that allows the user to develop a cell without writing computer code.

CIS is important in post-installation, too. In normal operation, the user might want to use the graphics editor to create a display that is linked to "the old way." Or if a problem develops once the line is operational, users can interactively play "what if" against the system.

The cell integration station is just one example of an advanced application environment. The point here is that it would provide a common user interface, common communication and a common data management system. Best of all, there would be no need to mention the hardware platform or operating system.

Friscia is president of Advanced Manufacturing Research, Inc., a Cambridge, Mass.-based research and consulting firm.

before he bought PCs.



When he got his first job on Wall Street, Tom's HP calculator was his most valued possession. It was the combination of innovation and reliability that gave him an edge. So when his Information Systems Manager recommended they go with Hewlett-Packard personal computers, Tom needed no convincing.

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Assistance

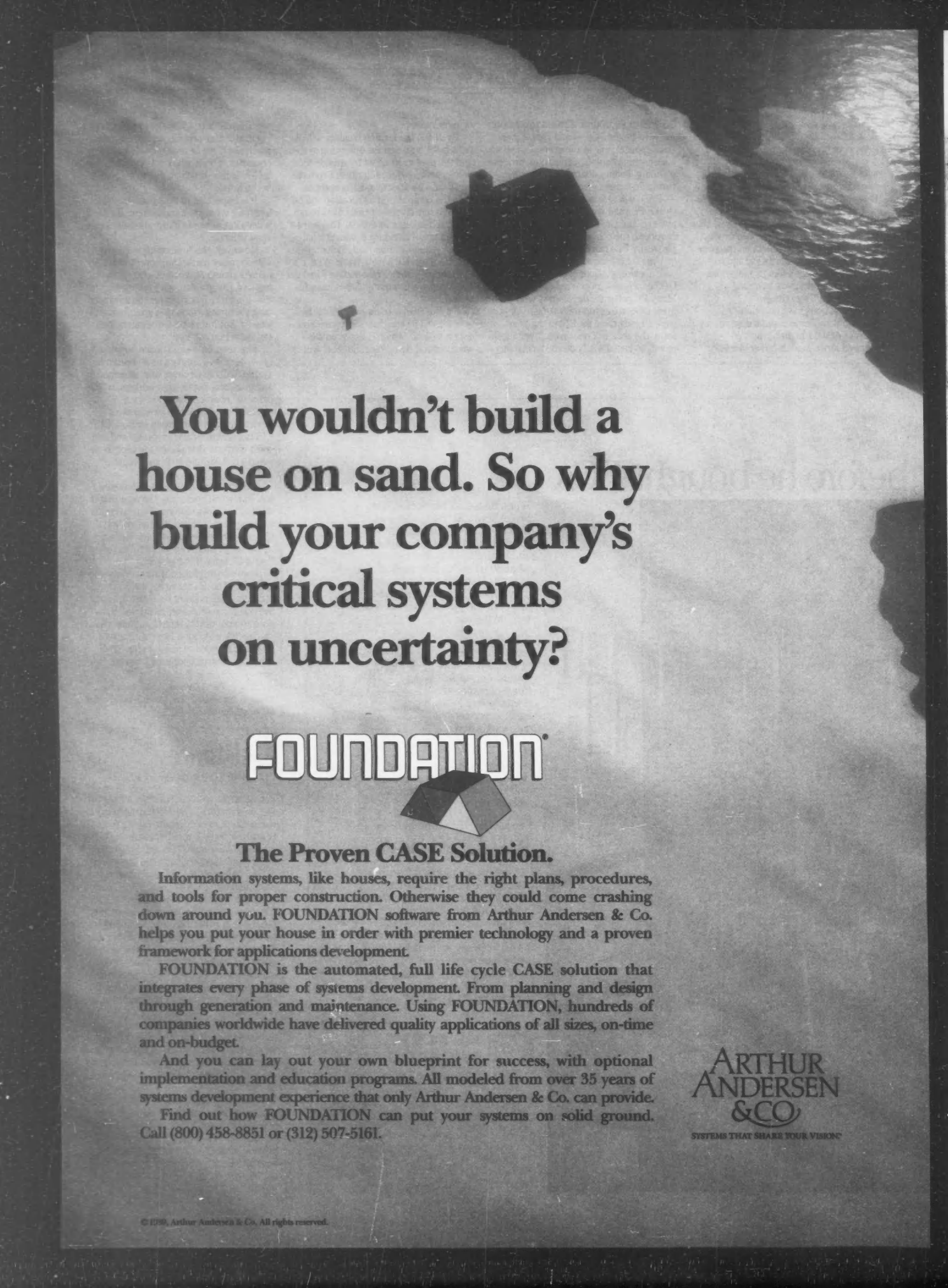
CONTINUED FROM PAGE 39

handle about 50 complete tax topics for novice assistors. The Boston prototype, using the Level 5 expert system shell from New York-based Information Builders, Inc., will run on 155 stand-alone personal computers sporting the Intel Corp. 80386 chip and 2M bytes of random-access memory.

If the Boston test is successful, the Taxpayer Service Assistant could be phased in at other IRS telephone centers throughout the country. However, the IRS is expected to transform the system into a networked PC application or use a minicomputer for distributed processing to ensure that it can update the system for all 5,000 users when tax laws and regulations change.

Eventually, a version of the expert system could be constructed for direct use by taxpayers, Beckman said. A direct-access system could be used by walk-in taxpayers at IRS offices or for dial-up inquiries, he said.

But Beckman cautioned that a direct-access system would have to be rigorously tested to make it "bomb-proof." In other words, the system would have to provide virtually 100% correct answers because there would be no human buffer or "reality check" on the system's answers.



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NEW PRODUCTS

Systems

A monitor and controller that provide full-page displays of IBM and Interleaf, Inc.'s word processing, desktop publishing and graphics software have been announced by Vermont Microsystems, Inc.

The Page Manager Series 12 monitor and Intel Corp. 82786 coprocessor-based controller reportedly provide IBM Interleaf Publisher with 1,280- by 960-pixel resolution on a 20-in. monochrome monitor with noninterlaced full-page display, the company said.

The price of the monitor and controller is $2,395. Interleaf Publisher is priced at $995.

Vermont Microsystems
11 Tigan St.
P.O. Box 236
Winooski, Vt. 05404
802-655-2860

A battery-powered Intel Corp. 80C286-based portable personal computer with a 40M-byte hard disk drive has been introduced by Toshiba America Information Systems, Inc.

The T1600/40 is said to be a companion product to the original T1600 with a 20M-byte hard drive, except that the 40M-byte drive has an average access time of 29 msec compared with the 20M-byte drive time of 27 msec. Also, the unit weighs 12.6 pounds instead of 11.6 pounds. The T1600/40 has 1M byte of random-access memory expandable to 5M bytes, supports the Intel 80C287 coprocessor, has two serial ports and a dedicated modem slot. The price is $5,599.

Toshiba America Information Systems
9740 Irvine Blvd.
Irvine, Calif. 92718
714-583-3000

A Federal Communications Commission-approved Intel Corp. 80286-based laptop has been unveiled by Dauphin Technology, Inc.

The Lappro-286 is said to offer a 40M-byte hard disk with an average access time of 28 msec, an internal power supply with an auto-adjust feature for changes in voltage, four power options including a battery pack and an internal modem option.

According to the company, the computer includes a Hercules Computer Technology, Inc. monochrome supertwist, backlit LCD and the DR DOS operating system from Digital Research, Inc., which is similar to and compatible with MS-DOS. The price is $3,495.

Dauphin Technology
1125 E. St. Charles Road
Lombard, Ill. 60148
312-627-4004

Software applications packages

Prime Computer, Inc. has announced a computer-aided manufacturing software package that generates three-axis numerical control tool paths for three-dimensional surface models created with Prime's Personal Designer software.

PM3D runs on DOS-based IBM Personal Computer AT compatibles, provides tool-path containment, multisurface tool-path generation and dynamic tool-path displays. It costs $6,800.

Prime Computer
Prime Park
Natick, Mass. 01760
508-655-8000

Five function libraries that perform financial and investment calculations within Lotus Development Corp.'s 1-2-3 and Symphony spreadsheets have been introduced by Tech Hackers, Inc.

The Analyst series reportedly includes 135 functions in five libraries: Financial, Bond, Options, MBS and Stats Analysts. Requirements include an IBM Personal System/2, Personal Computer, AT or compatible with math coprocessor support, DOS Version 2.0 or higher, Lotus' 1-2-3 Version 2.0 or higher or Symphony.

Financial and Stats Analyst libraries sell for $195 each, Bond, Options and MBS Analyst libraries sell for $495 each, and all five together sell for $1,495.

Tech Hackers
515 Broadway
New York, N.Y. 10012
212-941-7330

Automated business letter writing for the IBM Personal Computer, AT, Personal System/2 and compatibles has been announced by Lightning Word Corp.

The Instant Business Letters System is said to offer hundreds of business letters covering topics ranging from sales to collections that the user can customize. A card file database reportedly maintains names and addresses that can be merged with the letters. The retail price is $69.

Lightning Word
Suite 206
1601 Civic Center Drive
Santa Clara, Calif. 95050
408-241-1990

Adobe Systems, Inc. has introduced forms processing software that allows the Apple Computer, Inc. Macintosh user to automate existing forms.

Called Trueform, the package reportedly accepts electronic forms from scanners with the standard Apple scanner interface and from drawing programs such

Continued on page 52

There Is Only One Computer Newspaper That Covers Every Aspect Of The Information System



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* The Wall Street Journal (1987) — "Survey of the Information Processing Marketplace".
* The Adams Co. (1988) — "Information Systems Management Study".

COMPUTERWORLD

Continued from page 51

as Adobe Illustrator 88, Claris Corp.'s Macpaint and Aldus Corp.'s Pagemaker.

According to Adobe, other features include spreadsheet capabilities, the ability to link to databases and a fourth-dimensional printing module. Consisting of two programs, the complete package costs $395 and is currently available. A four-pack of the Fill-Out program sells for $295.

Adobe Systems
P.O. Box 7900
1585 Charleston Road
415-961-4400

Development tools

English Knowledge Systems, Inc. has released Jake Version 1.1, a natural-language C library that allows application programmers to add a natural-language front end to software applications, according to the company.

The latest release reportedly provides two additional libraries — one for OS/2 and one for Microsoft Corp.'s Windows environment. The package is priced at $495, and free upgrades will be provided to registered users, the vendor said.

English Knowledge Systems
5525 Scotts Valley Drive, No.22
Scotts Valley, Calif. 95066
408-438-6922

Via Development Corp. has released EEPD-ASL Version 2.1, an automated symbols library that operates with Autodesk, Inc.'s Autocad package to design electrical controls.

The library uses pull-down menus and icons to aid users in generating electronic controls schematics, the vendor said. Features reportedly include automatic generation of both single- and three-phase columns, generation of reference line numbers and automatic installation. The program requires Autocad 9.0 or higher and an 11- by 11-in. digitizer or mouse.

EEPD-ASL Version 2.1 costs $995.

Via Development
Suite 110
550 Congressional Blvd.
Carmel, Ind. 46032
317-843-5252

Gimpel Software has enhanced its diagnostics package for the Commodore Business Machines, Inc. Amiga environment.

Lint 3.0 was developed as a diagnostic facility for the C programming language to report bugs, glitches and inconsistencies, the company said. The latest release reportedly includes 50 additional error messages and is offered with a variety of options for user customization. The product runs under Amiga-DOS with a minimum of 196K bytes of memory. It is priced at $98.

Gimpel Software
3207 Hogarth Lane
Collegeville, Pa. 19426
215-584-4261

Progress Software Corp. has announced a pop-up utility library of development tools for the company's application development software users.

Workbench reportedly allows users to display ASCII tables, key codes, field definitions, user identifications and color tables. The program also permits developers to test multiuser applications and run terminal benchmarks without leaving the Progress environment, the company said. Workbench runs on personal computers under DOS and Intel Corp. 80286- and 80386-based systems under Microsoft Corp. Xenix, as well as the NCR Corp. Tower 32 series and Sun Microsystems, Inc. workstations. Pricing ranges from $200 to $2,500.

Progress Software
5 Oak Park
Bedford, Mass. 01730
617-275-4500

Data storage

Rybs Electronics, Inc. has introduced software reportedly designed to extend DOS memory in real mode from 640K to 928K bytes on computers using chip sets from Chips and Technologies, Inc. and Trident Microsystems.

According to the company, Hichips uses Rybs' Advanced Memory Specification to address unused memory between the uppermost limit of DOS, 640K bytes and 1M byte, thereby providing additional DOS memory without taking away hardware expansion slots. The retail price is $225.

Rybs Electronics
2590 Central Ave.
Boulder, Colo. 80301
303-444-6073

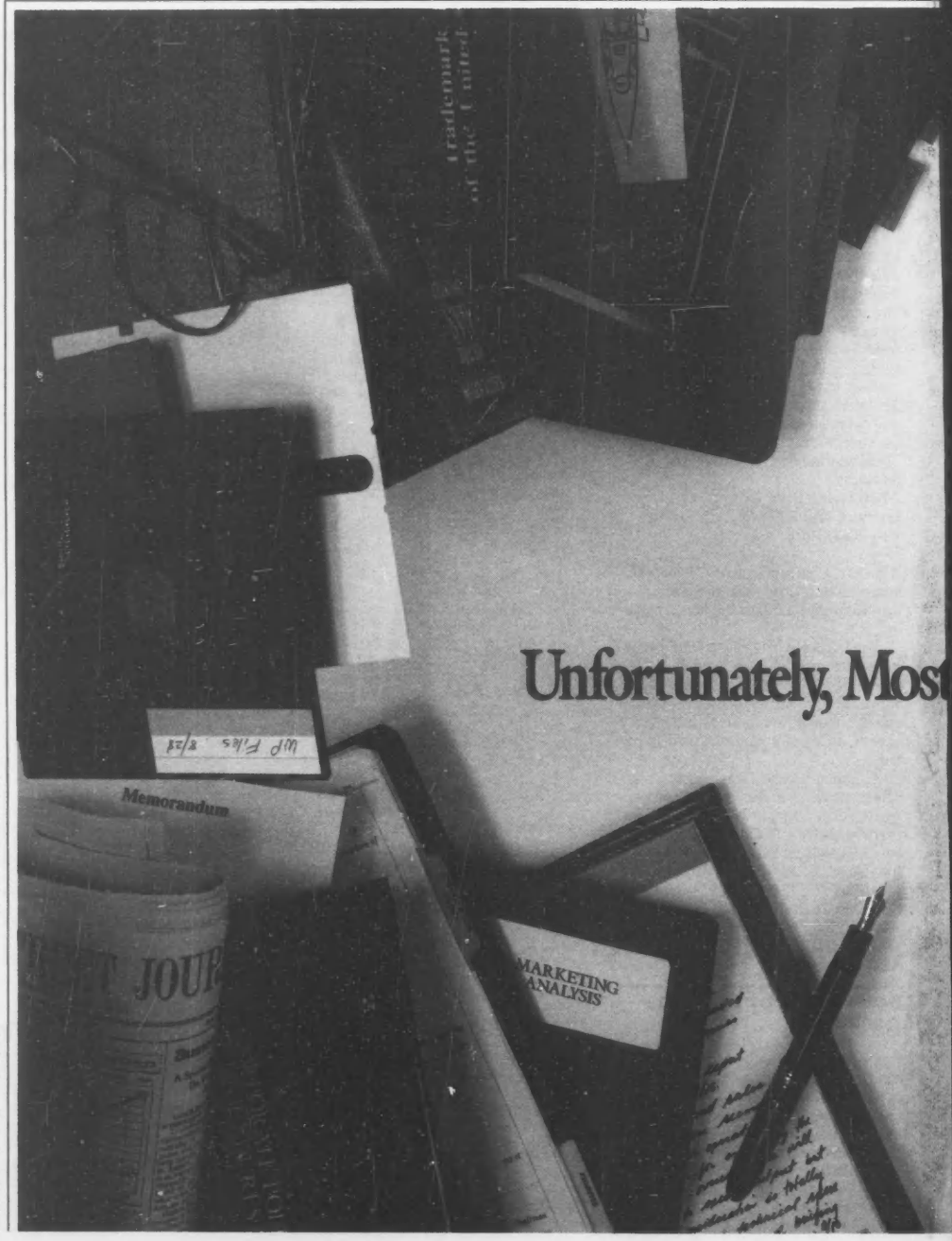
A series of hard disk drives for laptop computers has been introduced by Systems Peripherals Consultants, Inc.

The LHD series was designed for laptop computers from Toshiba Corp., Tandy Corp. and IBM but may also be shared with an IBM Personal Computer XT and AT desktop computer, eliminating the need for data transport systems. The drive and power supply are contained in a single chassis measuring 3½- by 6- by 13-in. and weighing 6 pounds. Using 110 V AC only, the drives are listed at an introductory price of $595.

Systems Peripherals Consultants
7950 Silverton Ave., 107
San Diego, Calif. 92126
619-693-8611

Micro Design International, Inc. has announced a 600M-byte rewritable optical-disk system for IBM-compatible minicomputers.

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Continued from page 52

The Laserbank 600 R is reportedly available with software interfaces that allow it to operate with either MS-DOS, The Santa Cruz Operation's SCO Xenix or Novell, Inc.'s Netware operating systems, supporting all of the operating system's standard file-system manipulation commands. According to the company, the disk access time is 95 msec.; IBM AT bus and Micro Channel Architecture versions are available.

The subsystem is priced at $6,995, with additional laser disks costing $300 each.

Micro Design International
6985 University Blvd.
Winter Park, Fla. 32792
407-677-8333

Storage Dimensions, Inc. has announced a line of erasable optical subsystems offering capacities of 1G byte per cartridge, an average seek time of 35 msec and an average data transfer rate of 10M bit/sec., a performance said to be equivalent to many Winchester fixed disk drives.

According to the company, the Laserstor Erasable Optical subsystems support Intel Corp. 80286 and 80386 DOS, IBM Personal System/2, Apple Computer, Inc. Macintosh and Novell Corp. Netware environments. One- and two-drive external subsystems reportedly feature the small computer systems interface, while the 650M-byte cartridge version adheres to the International Standards Organization standard, enabling data to be exchanged with other manufacturers' drives.

Prices start at $7,995, with the single-drive model available in volume this month.

Storage Dimensions
2145 Hamilton Ave.
San Jose, Calif. 95125
408-879-0300

Board-level devices

A coprocessor system designed for IBM Personal Computer ATs and Intel Corp. 80386-compatible machines has been introduced by Yarc Systems Corp.

Dubbed the AT-Super, the unit reportedly combines reduced instruction set computing technology with the MS-DOS environment and allows direct access to graphics and other I/O cards in the AT bus. According to the vendor, the product includes 512K bytes of static data memory and 2M bytes of instruction memory on-board, as well as a 50-MHz system clock. It is priced at $4,595.

Yarc Systems
Suite 1020
15760 Ventura Blvd.
Encino, Calif. 91436
818-990-3095

Commodore Business Machines, Inc. has introduced the A2286D Bridgeboard coprocessor card.

The board plugs directly into the expansion slot of the Commodore Amiga 2000, 2000HD or 2500 computer to provide the system with IBM Personal Computer AT and MS-DOS compatibility. The card reportedly contains an Intel Corp. 80286 CPU running at 8 MHz, 1M byte of random-access memory and a socket for an Intel 80287 math coprocessor. It is priced at $1,599.

Commodore Business Machines
1200 Wilson Drive
West Chester, Pa. 19380
215-431-9100

A memory board for the IBM Personal System/2 Models 70 and 80 has been introduced by Intel Corp.

The Above Board MC32 reportedly provides as much as 8M bytes of extended memory and is currently available.

The product offers users the room to run large or multiple programs and is especially suited for software development, networks and database applications, the company said.

The version with no installed memory costs $595, and the 4M-byte configuration is priced at $2,895.

Intel
CO3-7
5200 N.E. Elam Young Pkwy.
Hillsboro, Ore. 97124
503-629-7354

Dell Computer Corp. has moved into the high-resolution personal computer graphics arena with the announcement of the Dell Graphics Performance Series (GPX).

The series consists of two graphics subsystems designed to complement the company's existing line of Intel Corp. 80386- and 80386SX-based products, the vendor said. The GPX 1024/16 graphics accelerator board reportedly provides 16 colors with 512K bytes of memory, and the GPX 1024/256 board offers 256 colors with 1M byte of memory. Both units can accommodate an optional Video Graphics Array module and are offered with a choice of either a 16- or 19-in. multifrequency graphics performance display.

Pricing ranges from $1,099 to $2,499, depending on configuration.

Dell Computer
9505 Arboretum Blvd.
Austin, Texas 78759
512-338-4400

AST Research, Inc. has upgraded its Rampage 286 board to include 2M bytes of memory and has announced price reductions on memory upgrade products. The Rampageplus 286 can reportedly be upgraded to a total of 8M bytes of memory, features support for the EMS 4.0 expanded memory specification and contains a utility for creating large random-access memory disks and buffered output of print data. The price is $1,445.

Continued on page 56



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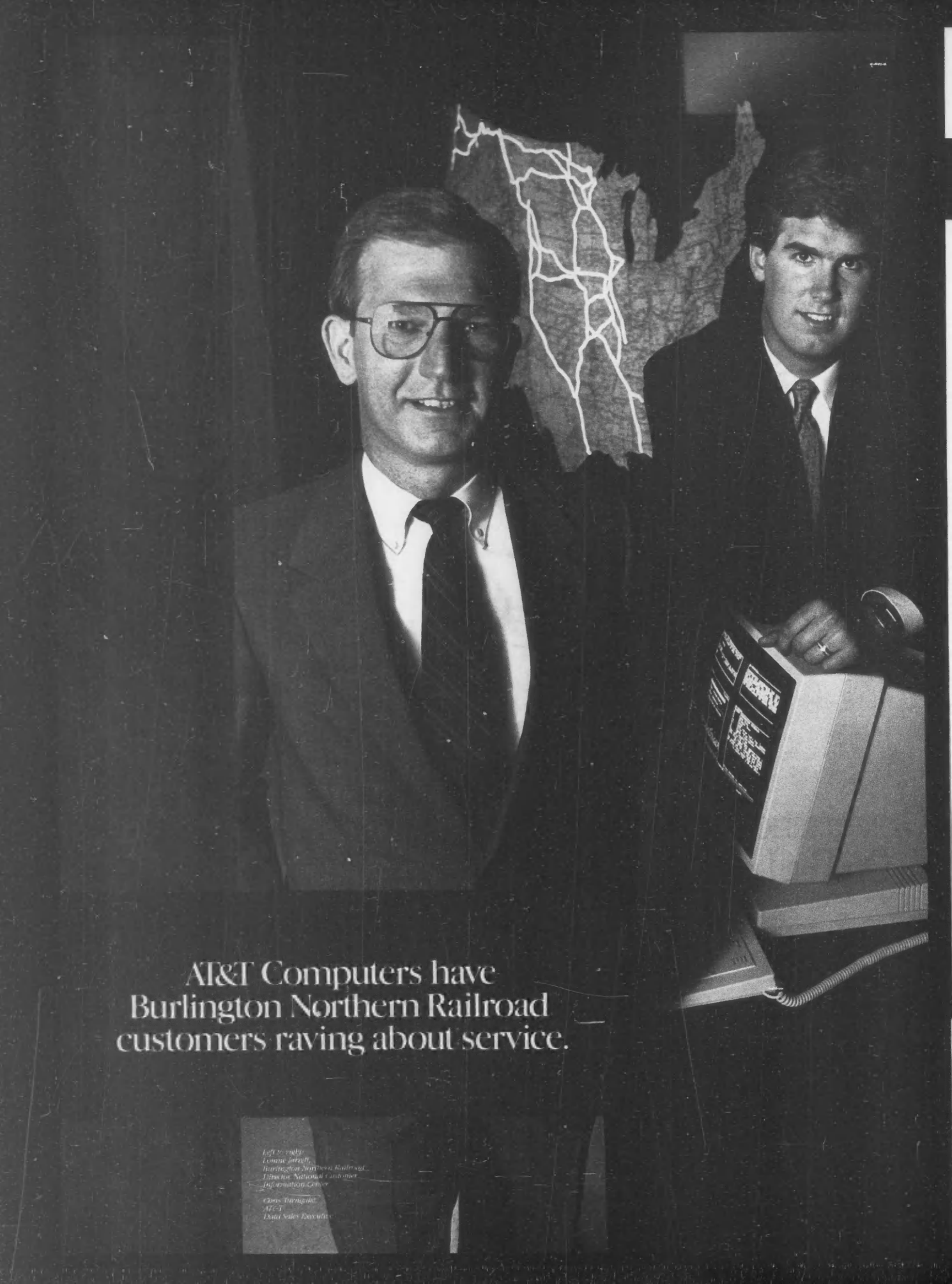
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AT&T Computers have
Burlington Northern Railroad
customers raving about service.
Left to right:
Lonnie Jarrett,
Burlington Northern Railroad
Director, National Customer
Information Center
Chris Turnquist,
AT&T
Data Sales Executive

Denver, Colorado
May 2, 1989

The Burlington Northern National TrackSmart® Center is getting rave reviews from its customers. And AT&T's distributed networked computer solution behind it is getting rave reviews from Burlington Northern. Burlington Northern's Lonnie Jarrell tells AT&T's Chris Turnquist why AT&T Computers provide a better way to serve customers of the longest railroad in the country.

Lonnie: We want to be known for superior customer service. So we planned proactive shipment monitoring through a new customer service concept—the National TrackSmart Center.

Chris: And better customer service means getting information to your customers, in *their* reporting format, as soon as your reps have it.

Lonnie: Exactly. All we had to do was listen to our customers to understand their transportation information needs. That was plenty of inspiration. We knew then that we needed a system that would let our reps instantly locate cars and report shipment status to customers immediately.

Chris: I remember when your reps could only handle one customer at a time. They had to query the mainframe database car by car. And *then* manually record their findings and send them out. Now each rep can handle up to ten customers, right?

Lonnie: Absolutely, plus the rep has more time to serve his customers better. Now they save time by tracking every car from *one* CRT. The AT&T 6500 Multifunction Communications System gives them multi-window access to two synchronous sessions on our host, as well as async access to the TrackSmart application and AT&T Mail. Both TrackSmart and AT&T Mail run concurrently on the AT&T 3B2/1000 Computer. So the reps get information the second they need it.

Chris: And you're able to tap information easily.

Lonnie: Right. Because you molded AT&T distributed networked computing to fit the Burlington Northern, rather than the other way around. You provide it all—computer networking systems and communications expertise. Plus you blend it all together with other systems better than any company I've ever seen.

Chris: I understand one customer wrote a BN rep promising him an official company ID naming him their Assistant Transportation Manager.

Lonnie: That's true. But you know, if we're going to be a partner to our customers, we have to be a partner with vendors who can take us in that direction.

The Burlington Northern Computer Solution

THE CHALLENGE

Differentiate Burlington Northern as a superior provider of customer service.

THE SOLUTION

A distributed networked computer solution integrating Burlington Northern's applications with a UNIX® System V-based Informix® 4GL database management package. An AT&T 3B2/1000 Computer is the gateway to the host for TrackSmart information. The AT&T 6500 Multifunction Communications System provides host access with four-window functions appearing on AT&T 615 displays. AT&T Mail sets up an E-mail link between reps and customers. AT&T Mail with Private Message Exchange TERM is a private E-mail link between Burlington Northern reps and TrackSmart.

THE RESULTS

The system increases the number of customers a representative services tenfold. Some customers have indicated TrackSmart saves them at least four hours daily.

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UNIX is a registered trademark of AT&T in the U.S. and other countries. ©1989 AT&T

AT&T
Computer Systems

Continued from page 53

Prices have been reduced from $2,195 to $1,595 for the Premium Fastboard/386 and from $245 to $95 for the I/O Pak 286-SP, a serial and parallel port option said to be designed specifically for the Rampageplus 286.

AST Research
2121 Alton Ave.
Irvine, Calif. 92714
714-863-1333

Macintosh products

A series of Apple Computer, Inc. Quickdraw-based color printers for the Macintosh has been developed by Seiko Instruments U.S.A., Inc.

The QD-5500 series is said to offer Adobe Systems, Inc. Postscript-like outline font technology and has image-size compatibility with the Apple Laserwriter printer.

According to Seiko, the printers feature 300 dot/in. resolution and are capable of printing large images.

Single-user and networking models are available with prices ranging from $7,000 to $14,000, depending on the configuration.

Single-user QD-5500s are currently available; the networking version will follow in October.

Seiko Instruments
1130 Ringwood Court
San Jose, Calif. 95131
408-943-9100

HJC Software, Inc. has announced Virex 2.0, an antivirus product for the Apple Computer, Inc. Macintosh that reportedly incorporates software that continuously runs in the background and monitors the system to prevent a virus attack.

Virex is also a diagnostic tool that can be used to detect new or previously unknown viruses. It has the ability to diagnose and repair files infected by multiple viruses, the vendor said.

Single updates for registered users are priced at $15. They are free to users who purchased an earlier version of the product after July 15.

HJC Software
P.O. Box 51816
Durham, N.C. 27717
919-490-1277

Macromind, Inc. has extended its line of multimedia software products for the Apple Computer, Inc. Macintosh.

Macromind Accelerator reportedly performs a compile-like process on the company's Director or Videoworks II documents, speeding up the playback of documents to a maximum of 30 frames per second and enabling users to produce digital video-quality animation. The price is $195.

The Macromind Director Interactive Toolkit is said to be designed for users producing interactive presentations, time-based simulations, prototypes and courseware. It is available for $300 to registered owners of Director.

The runtime version of Macromind Director, called Macromind Player, is available as a free upgrade to registered owners of Director and will be bundled with future shipments of the software.

Macromind
Suite 408
410 Townsend St.
San Francisco, Calif. 94107
415-442-0200

Peripherals

Laser-quality printing from a personal desktop printer for Apple Computer, Inc. Macintosh users has been announced by Hewlett-Packard Co.

The HP Deskwriter ink-jet printer is reportedly Quickdraw-based and works with a variety of Apple Macintosh business software.

The printer is said to provide 300 by 300 dot/in. printing and requires a hard disk for font storage.

The price for the printer is $1,195 and includes printer-resource software, four font families, one print cartridge sufficient for approximately 400 pages, an external power module and an owner's manual.

Hewlett-Packard
19310 Pruneridge Ave.
Cupertino, Calif. 95014
800-752-0900

Arrick/Microsync, Inc. has enhanced its Boomerang power protection system for IBM Personal Computers and compatibles. When a power outage is detected, the unit reportedly supplies battery power to the computer while it saves the state of the entire system to hard disk. According to the vendor, the product now offers support for Video Graphics Array technology and operates with most Intel Corp. 80386-based systems under DOS 2.1 or higher. Boomerang is priced at $299.

Arrick/Microsync
2107 W. Euless Blvd.
Euless, Texas 76040
800-543-0161

Sharp Electronics Corp. has announced a laser printer with a resolution of 300 dot/in. designed for the desktop.

Reportedly offering 6 page/min printing, the JX-9500 measures 13.4 by 14.2 by 10½ in. Standard printer emulations include Hewlett-Packard Co. Laserjet Series II, Epson America, Inc. FX-80, IBM Graphics Printer, IBM Pro Printer and Diablo 630, the company said.

With two font card slots included as standard, the JX-9500 printer is priced at $1,995.

Sharp Electronics
Sharp Plaza
Mahwah, N.J. 07430
201-529-9500

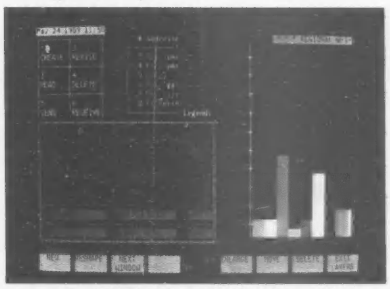


The AT&T 3B2/1000 Computer. It's not just working on the railroad.

Whether you're into networking, office automation, software development, or anything in between, one thing is certain. You've just found the ultimate in distributed networked computing.

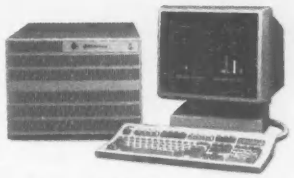
And Burlington Northern Railroad would agree. After all, they brought the AT&T 3B2/1000 Computer on board as the primary element of their National Tracksmart® Center. It was their ticket to better customer service.

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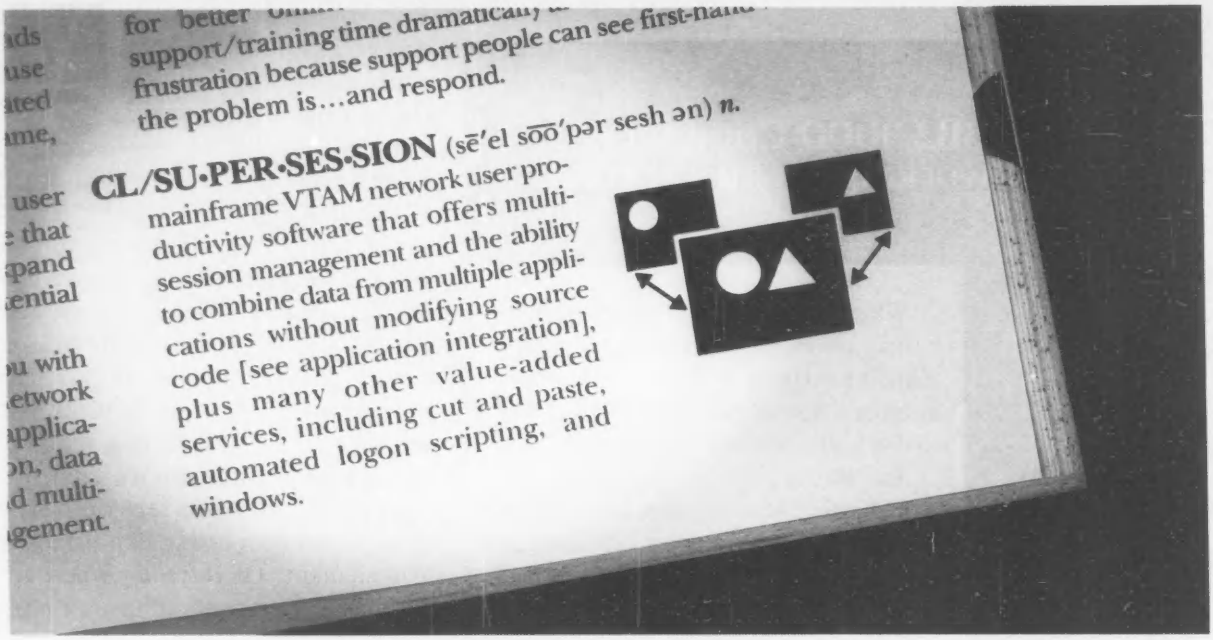
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DATA STREAM

Elisabeth Horwitt

'S' words for the 'I' word



Multivendor network integration: You can't live with it, and you can't live without it. It's a serious problem to users who, for example, are trying to access an IBM mainframe database from a remote TCP/IP LAN over a crowded gateway.

It's a serious challenge (read: headache) to information systems and communications managers trying to provide users on various local-area networks and hosts with access to corporatewide resources. And it's a serious potential revenue source to a growing pack of vendors that claim to have everything users need to solve their network integration problems. You can tell these guys by their constant use of the dreaded "S" word: "solutions."

The "S" word was first bandied about years ago by firms that sold several types of networking devices, or devices that did more than one networking function (such as PAD/concentrator or bridge-router). These guys wanted to differentiate their offerings from mere "products" by calling them solutions.

Continued on page 63

Second-tier carriers on the rise

ANALYSIS

BY ELISABETH HORWITT
CW STAFF

Enhanced services, greater reliability and lower rates are among the riches that Fortune 500 users have reaped from signing up — or at least threatening to sign up — with the so-called "second-tier" long-distance carriers.

Companies such as Cable & Wireless Communications, Inc. and Williams Telecommunications Group have become forces to be reckoned with in the last year or two, analysts said — to the point where AT&T, U.S. Sprint Communications Co. and MCI Communications Corp. sometimes seem to be aiming their rate cuts and introductions more at their smaller rivals than at each other.

The second-tier providers have survived by making assets out of what could have been an insuperable handicap in the interexchange market: their limited resources and geographic range. Many of the smaller regional carriers started out as resellers of bandwidth, which put their rates at the mercy of their larger competitors.

But most such providers have aggressively been laying their own fiber-optic cabling and establishing digital switching facilities in the last year or two.

"The second-tier guys were the first with all-digital networks: The bigger the carrier, the harder it is to make digital [facilities] ubiquitous," said Tim Zerbiec, a principal at Dedham, Mass.-based research firm Vertical Systems Group.

Ahead of the pack

Having all-digital facilities enabled the second-tier carriers to provide better reliability, greater manageability and the bandwidth flexibility associated with digital media — often ahead of AT&T, MCI and Sprint, according to William Rahe, president of Rockville, Md., consulting firm Aries-MPSG and a former director of marketing for second-tier provider Lightnet.

For example, Williams Telecommunications, Cable & Wireless and Data America Corp. were three of the first providers to announce fractional T1 services, which allow users to route and pay for multiple 64K bit/sec. channels as if they were one circuit.

AT&T, MCI and Sprint all hastened to bring out their own fractional offerings this year.

The smaller carriers "do prod the Big Three" to be a bit more responsive to customer needs, introducing enhanced services perhaps a little faster and lowering prices a little more than they might otherwise have done, Rahe said.

Sprint, for example, has been adjusting its rates recently to

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- LAN nodes added as E-mail wires hum. Page 60.
- Thomas Heard nominated for introducing Defense Department to EDI. Page 61.

Tymnet brews Coors LAN interconnection

ON SITE

BY ELISABETH HORWITT
CW STAFF

GOLDEN, Colo. — Coors Brewing Co. has tapped its systems integrator Tymnet, Inc. to interconnect local-area networks at various Coors facilities via Tymnet's public data network.

Tymnet, a McDonnell Douglas Corp. subsidiary that will shortly be sold to British Telecom, Inc. [CW, Aug. 7], was originally hired by Coors to interconnect six Ethernet LANs across the company's campus facility at its headquarters.

Tymnet connected the LANs over a 100M bit/sec. fiber-optic-based backbone using Fibronics International, Inc. interfaces, which support the Fiber Distributed Data Interface standard [CW, Aug. 21]. Currently, Coors employees use the LANs and the backbone primarily to exchange electronic mail and computer-aided design (CAD) documents, according to John Andrews, a network planner at Coors.



Installing the fiber-based backbone to "connect local campus users at Ethernet speeds or greater" was the first phase, which was just completed, said Coors network planner William Rolfe. The second phase will be to bring 20 remote locations into the main network at headquarters via Tymnet's packet-switching network, he added.

Tymnet will install LAN-to-LAN bridges from Cisco Systems, Inc. on Coors' Ethernet LANs to provide users with access to its public data network via an X.25 interface, Andrews said.

Coors decided to go with a packet-switched network rather than with leased 1.5M bit/sec. T1 lines because data traffic between remote sites and headquarters does not yet justify the need for greater, dedicated bandwidth, Andrews said. However, a significant increase in such traffic, particularly in the sending of complex CAD documents, might cause Coors to migrate to the more expensive links in the future, he added.

The beverage company is also keeping an eye on traffic levels on individual LANs, Rolfe said. Right now, most CAD users are

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LAN E-mail to skyrocket, survey finds

AMIEL KORNEL
CW STAFF

Human volubility and the growing popularity of distributed processing will lead IS to implement more corporate electronic mail on local-area networks, according to a recently published report on electronic messaging in the 1990s.

The analysis, being released this month by market research firm International Resource Development, Inc. (IRD) in New Canaan, Conn., examines trends in telex, voice, facsimile and computer-based messaging. All those areas, except-ing telex, should grow steadily over the next five years. LAN-based E-mail stands out as a major winner.

"We are seeing additions [of new nodes] to LANs faster than anyone expected," explained Kenneth Bosomworth, project manager for the study at IRD. As a network expands and the number of people with which each user can communicate grows, he explained, E-mail becomes more attractive.

IRD projects that sales of LAN-based E-mail applications, a niche market worth an estimated $38 million this year, will swell to $80 million in two years, $170 million by 1994 and $350 million by 1999.

The experience of some major users seems to confirm the report's conclusions. "We are starting to see a surge of LAN E-mail systems," said Peter Donaghy, manager of customer services and support at Hughes Aircraft Co. "I believe that over the long haul, there will be tremendous growth in LANs and, in particular, in E-mail."

Other users interviewed, however, said they did not expect to shift E-mail to LANs anytime soon. "Do I see it happening in the next three to five years?" asked Gary Savarese, applications project manager at Eastman Kodak Co. "Probably not." He said there were not yet enough LANs at Kodak to justify such a move.

The manager of office automation and IS planning at M. W. Kellogg Co. headquarters in Houston is also skeptical. "No specific need has shown up to have E-mail on LANs," Linda Stettbacher said, citing a recent end-user survey conducted at the company. Current E-mail needs are handled by Digital Equipment Corp.'s VMS Mail running on a Vaxcluster.

IRD said the LAN-related growth means private, host-based systems will attract fewer new users. The market for host-based private systems running on multiuser computers is projected to reach a value of $188 million in 1989 and grow to $270 in 1991 before peaking at $300 million in five years. By 1999, however, revenues for this category of products are expected to slide to $150 million as prices drop and LAN-based E-mail dominates.

Upstarts vs. establishment

The trend sets the stage for a battle between established vendors such as IBM, DEC, Hewlett-Packard Co. and Wang Laboratories, Inc. on one side and the upstarts beginning to hawk messaging software designed for LANs on the other.

"Most host-based E-mail comes from the [computer] suppliers," said David Knight, associate director at Retix, Inc. "And that's because they were the only game in town. They haven't done a great job of cascading that strength down into the LAN area."

LAN-based E-mail packages from companies like market leader CC:Mail in Palo Alto, Calif., are said by users and consultants to be much more feature-rich than mini or mainframe products currently sold. "The new products have a much higher degree of user-friendliness," Donaghy said.

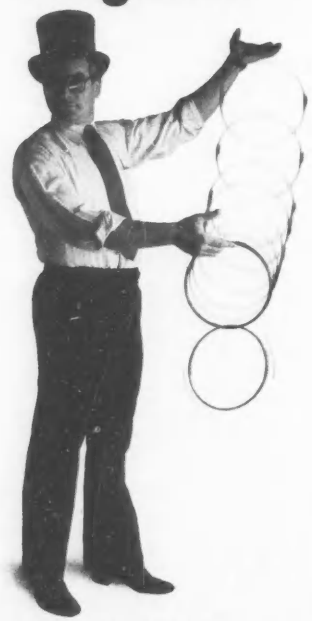
In addition to finding that small is beautiful, companies downsizing IS to LANs are likely to discover that talk is cheap. According to Eric Arnum, editor of "Electronic Mail and Micro Systems," a newsletter published by IRD, the monthly cost of running corporate E-mail on LANs is between two to four times less than mainframe- or mini-based E-mail.

In a comparative analysis, Arnum compared the hypothetical cost of LAN-based and mainframe systems bringing E-mail to 10,000 corporate users spread across the country. He came out with a monthly cost per user of $3.80 for the LAN solution and $14.50 for the mainframe application. Most of the savings come from reduced communications costs, he said.

While only an estimated 10% of the roughly 45 million to 50 million white-collar workers in the U.S. use E-mail, Bosomworth said, that figure could grow to 15% in the next two years and 30% by 1994. With penetration reaching those levels, cost will become an even more important issue than it is today, putting a powerful sales argument in the marketing arsenal of LAN-based E-mail suppliers.

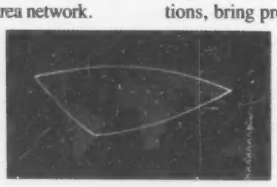
In other areas addressed by the IRD report, public electronic mailbox networks are expected to account for revenues of $376 million this year. The forecasters put this figure at $500 million in 1991, $800 million in 1994 and $1.2 billion by 1999. IRD characterizes these numbers as "worse than anticipated." The researchers place the blame on a number of factors, including competition from facsimile machines and the rising use of private E-mail systems.

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Logistics engineer honored

BY MITCH BETTS
CW STAFF

BETHESDA, Md. — Getting the massive bureaucracy of the U.S. Department of Defense (DOD) to try a new way of doing business, such as the emerging electronic data interchange (EDI), requires a good deal of tenacity, according to Thomas W. Heard.

Back in 1985, Heard, who was then a research fellow at the Logistics Management Institute, was studying the DOD's cargo management systems and discovered that the modernization program had ignored the use of EDI techniques that were being aggressively pursued in the private sector.

Heard seized upon that opportunity and convinced senior DOD officials to give EDI a try. Since then, he has helped the department conduct a pilot test, establish an EDI program office, modify inhibiting regulations and gear up for implementing an EDI program in the next three years.

In essence, the program will allow DOD shippers to submit their invoices electronically, which should reduce paperwork and boost efficiency.

For his work in launching and sustaining the project, Heard was recently among those who were nominated by local chapters of the Society of Logistics Engineers for a field award in material operations and distribution.

The Logistics Management Institute is a nonprofit federal research center established in 1961 to advise the Pentagon on logistics matters.

Heard said that much of the credit for the EDI program should go to Robert H. Moore, the Pentagon's director of transportation policy. Moore served as the project team's leading evangelist — "someone who can affect funding and shepherd the thing through many years of effort," Heard said.

Consensus for pilot testing

After convincing senior officials that EDI could reduce paperwork burdens, Heard organized and conducted a pilot test of EDI using the industry's ANSI X12 standard.

"We went to the private sector, firms like Du Pont, Eastman Kodak and Procter & Gamble, and asked them how they got started. There seemed to be a clear consensus that you need to give the whole program a jump start by having a small, manageable pilot test," he recalled.

The test was designed to identify the legal, organizational and technical barriers to the electronic exchange of routine transportation documents.

While it was successful in demonstrating the feasibility of EDI, the test also showed that the DOD needed a strategy for migrating from its paper-dominated practices to a largely paperless one.



LMI's Heard

Heard then guided the DOD in forming the EDI Program Office, which is in charge of coordinating that transition, upgrading systems at the DOD's freight payment centers, installing EDI capability at 145 DOD shipping centers and configuring the network.

He is now responsible for upgrading the DOD's largest freight payment center, the U.S. Army Finance and Accounting Center. The center is replacing financial software "that had undergone 20 years of patch-quilt modifications," Heard said.

Microsoft backs X.400 API group

AMIEL KORNEL
CW STAFF

An industry group promoting a standard interface for connecting electronic mail systems gained clout late last month when Microsoft Corp. joined its ranks.

The X.400 Application Programming Interface Association (APIA), co-founded last fall by Retix Corp. and Telenet Communications Corp., has proposed specifications for a gateway allowing proprietary E-mail applications running on local-area networks to exchange messages via X.400-compliant servers.

Widespread adoption of the standard, which has already received strong backing from aerospace companies, could lead to greater use of LAN-based E-mail. Microsoft joined the group two weeks after Banyan Systems, Inc., another firm active in PC networking, added its name to the membership roster. Total membership now stands at 22.

The APIA effort is likely to be bolstered further by the pending announcement of an agreement with UK-based X/Open Consortium Ltd. to jointly develop the X.400 API for use in LAN and Unix environments, according to David Knight, co-chairman of APIA. X/Open is a standards-promoting group that counts most major European computer vendors among its members.

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Bear, Stearns: Small is beautiful

Two years ago, Bear, Stearns & Co. chose two second-tier carriers to provide a "hoot-and-holler" digital backbone to support open conference circuits for everyone to listen to market information, according to Jeffrey Marshall, the Wall Street financial trading company's director of communications.

While all the contestants were essentially comparable in performance and delivery, Williams Telecommunications Group and its recently acquired subsidiary Lightnet quoted costs that were "dramatically lower" than their first-tier competition, Marshall said. "That shifted the decision; we're a very cost-conscious firm," he said.

However, Bear Stearns does use a number of other providers, including U.S. Sprint Communications Co. and MCI Communications Corp., for other parts of its network, Marshall said.

Employing a variety of carriers provides a number of advantages, including guaranteed route diversity, he added.

The trading company "did an in-depth study of the physical topology of every carrier in our network" and added pieces of other carriers' networks wherever one provider could not provide redundancy on its own, he added.

Bear Stearns chose an internal network management system because it seemed the most effective way to handle its complex multicarrier network, Marshall said.

"Originally we asked one carrier to manage network integrity, but since that time, we have implemented a lot of network management capabilities ourselves, [because] we manage more than one carrier, as well as an array of around-the-world communications links," Marshall said.

Bear Stearns chose private T1 equipment vendor Network Equipment Technologies, Inc., which the firm believes provides products "dynamic enough to give us a very true picture of network performance," Marshall said.

Multiple carriers not only ensure backup routing but also leave room for rate negotiation down the line, Marshall said. "We're not threatening, but competition breeds economic benefits for the customer, and we always want to take advantage," he said.

The first tier providers have since been catching up in the rate competition, "so we should see a very competitive T1 market in the next year or two," he added.

ELISABETH HORWITT

Second-tier

CONTINUED FROM PAGE 59

compete with Williams, "which has been making a major impact on Sprint's T1 revenues," he added.

Another area in which second-tier providers have led is guaranteed diverse routing, in which carriers assure that primary and backup circuits run over different cabling and switching facilities. A high-priority concern for Fortune 500 companies [CW, Aug. 7], diverse routing has been more readily available from second-tier providers that customarily use other carriers' facilities to complement their own, Rahe said.

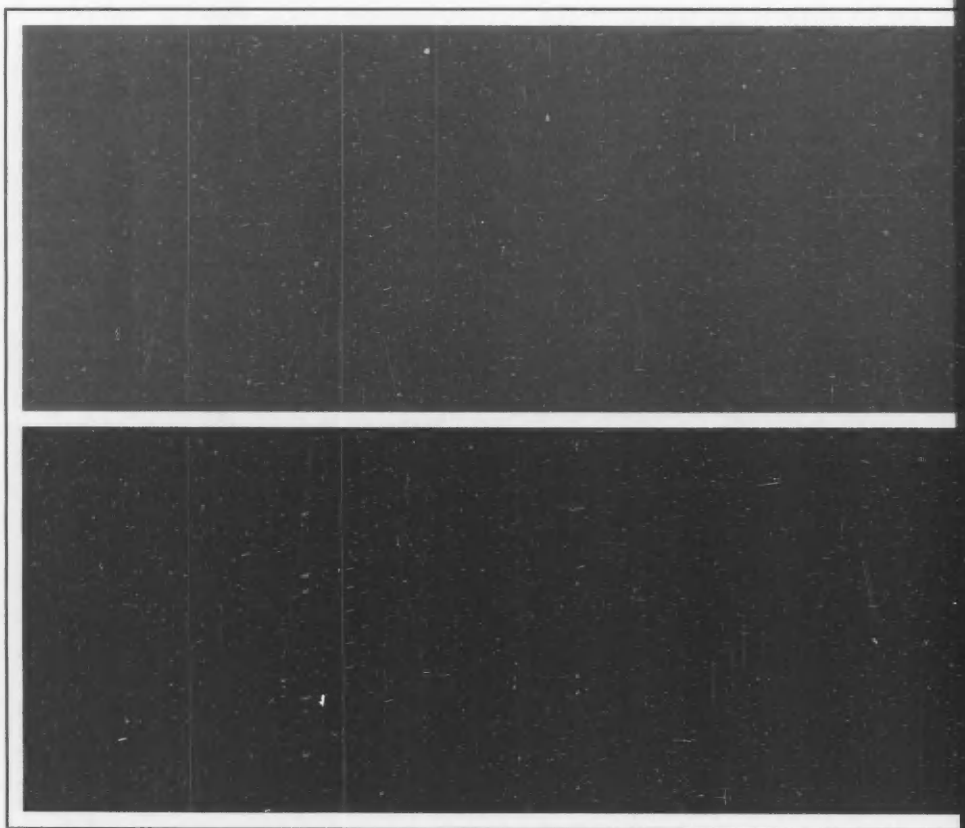
"I don't think AT&T is going to acquire facilities from other vendors, and Sprint and MCI don't like to either," Rahe said, although both of the latter companies said they do use other carriers' facilities to provide diverse routing in areas in which their own are not sufficient.

Regional providers are accustomed to extending their geographic reach through other carriers' facilities. Williams Telecommunications, for example, first teamed up with and then acquired Lightnet, whose geographic coverage complemented Williams' own.

The second-tier providers are likely to have a tougher time competing now that first-tier carriers have most of their digital and fiber-optic facilities in place. Many of the enhanced services such as fractional T1 and network management reporting to the user that have provided the second-tier with its competitive edge are becoming available from the Big Three. In addition, the bigger carriers, with their larger customer base, are in a better position to take advantage of the economies of scale provided by fiber-optic lines, which become more cost-effective with increases in the traffic they support.

Network management is likely to be the deciding issue that determines whether a Fortune 500 user goes with a first- or second-tier provider. "If we wind up building [and managing] the network ourselves, we would probably install a mix of carriers," including second-tier providers, said Kam Saifi, assistant vice-president of communications planning at Drexel Burnham Lambert, Inc.

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Horwitt

CONTINUED FROM PAGE 59

But now vendors are taking things a step further from mere solutions to "total solutions," meaning they can do it all for you, or at least try real hard. Such firms have three main methods for putting those solutions together:

• **Acquisitions and mergers.** Networking vendors such as Digital Communications Associates (with Fox, Cohesive, Microstuf and Forte) and Racal-Milgo (with Skynetwork, Interlan and Quanta) have attempted to provide full solutions by acquiring all the pieces they lack. The advantage of this method is that, with careful selection, you can get some pretty decent products without developing them from scratch. Cohesive's high-end T1 switches were a real coup for DCA, for instance.

The difficulty is in providing real integration of all those products, particularly from that all-important network management angle. Racal made a good move recently with a revamped network management system that oversees its own midrange Omnimux T1 multiplexers and the DCA 9000s that it resold, as well as assorted modems and a link to Netview.

Racal's obvious next step is to integrate its products with those of its recent acquisition, Interlan. At least it has product synergy at hand: Its T1 multiplexers could be used to interconnect Interlan's LANs across distance. Micom — Interlan's former owner — tried unsuccessfully for several years to come up with a good synergy between its private branch exchanges and Interlan's networks; it also reputedly had a lot of trouble integrating Interlan's maverick organization into its own — a problem Racal may inherit.

• **Platforms.** These "modular" systems are billed to act as concentrators, gateways, bridges, protocol converters and the like as well as to link just about any equipment you've got just by adding processor boards and software.

Actually, they are humongous monsters that are rarely cost-justifiable unless you have very special, complex communications needs that can be centralized at one site. This makes it hard to justify them as corporatewide communications systems, because a lot of sites and user groups primarily need black boxes that perform one or two communications functions well and at a reasonable price.

As communications catch-alls, the platforms are unlikely to do any particular networking function better than boxes designed for the purpose. Northern Telecom's recent decision to kill Meridian DNS is one indication of just how successful this market has been so far.

• **Network systems integration services.** This is where things could get interesting. The theory is that most large corporate users resist depending on one vendor for all their multivendor connectivity needs, but many would like outside help in choosing the right connectivity products and putting them all together.

The market is embryonic, but action is heating up. Small players include Tucker Network Technologies in South Norwalk, Conn., and International Telemanagement in Fairfax, Va. Midsize players include regional Bell holding companies such as Nynex as well as Fairfax, Va., company Network Management, Inc., which has been eating up smaller firms to compete with the big guns.

And then there are the big guns themselves, such as Computer Sciences, EDS and, lately, IBM. The latter, which officially entered the market just recently, is showing itself very willing to enlist the help of small, multivendor connectivity and network management vendors such as TSB and Carl Vanderbeek & Associates, although I suspect it expects you to base your "solution" on Netview, OS/2, IBM 370s and the like.

In fact, network systems integrators might well provide the best market for the "platform" guys as well as for other vendors that specialize in multivendor connectivity tools — the bridge-router faction, for example. If the systems integrators worked hard to find the really useful products and did not become enamored of a particular vendor (or their own products, in IBM's case), they might actually perform a useful service for vendors and users alike, matching the problem to the right (excuse me) solution.

Horwitt is a *Computerworld* senior editor, networking.

Coors

CONTINUED FROM PAGE 59

grouped together on their own LANs in separate parts of the campus, but they are gradually infiltrating the general user population, he said. If this trend continues, E-mail users may begin to suffer degradation of their response time because CAD transmissions are taking up so much of the Ethernet bandwidth, Rolfe said.

Coors will likely segregate CAD and E-mail users on different Ethernets, which would be linked to the FDDI backbone via Fibronics' recently announced dual-FDDI-to-Ethernet interface, Rolfe said. The interface is said to link two adjacent Ethernets onto the FDDI backbone for less than the price of the single-LAN interface that Coors currently uses.

Tymnet's pending sale to British Telecom should have no effect on relations, said Tymnet spokesman Donald Parkman: "We will continue to support all of our contracts. BT bought us partly for our [integration] business, partly for our people and partly for customers like Coors."

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NEW PRODUCTS

Network management

Digilog, Inc. has announced a supervisory system that performs local or remote monitoring, testing and sparing functions.

The Extended Supervisory System (ESS) is reportedly a vendor-independent digital and analog monitoring and testing device for network nodes of less than 45 circuits. Digilog's Network Supervisory System performs the same functions for networks with more than 45 circuits.

Both systems are said to be able to interface with RS-232, V.35 and AT&T's Dataphone Digital Service (DDS) at speeds up to 56K bit/sec.

An ESS for a 10-circuit configuration with built-in test equipment sells for $12,000.

Digilog
1370 Welsh Road
Montgomeryville, Pa. 18936
215-628-4530

Network Dimensions, Inc. has released a personal computer-based software package for visual display and documentation of communications networks.

Grafnet allows network managers and engineers to create and maintain a complete database of information on their wide-area network (WAN) nodes and links. The program overlays the data on maps of the U.S. for viewing on a PC screen, the company said, and provides report and documentation generation.

The software runs on IBM Personal Computers, XTs, ATs and compatibles under Microsoft Corp.'s Windows and is priced at $450.

Network Dimensions
Suite 122
5339 Prospect Road
San Jose, Calif. 95129
408-446-9598

Blue Lance has upgraded its local-area network management tool for Novell, Inc.'s Netware 2.0 and higher.

Release 2.0 of LT Stat reportedly provides documentation and reports on the system configuration of Novell Netware and the disk utilization of the file server. Features include system configuration accounting and the ability to report disk utilization by directory node, including subdirectories. The retail price is $299.

Blue Lance
Suite 700
1700 W. Loop South
Houston, Texas 77027
713-680-1187

OS/2 networking

Saros Corp. has introduced a file-sharing system that runs on personal computer local-area networks.

Saros Fileshare reportedly allows users to find, share and control files across the network, regardless of what application was used to create the file. A single program running on multiple distributed computers, the system is said to support MS-DOS workstations and uses the multitasking and interprocess communications capabilities of OS/2 on multiple network servers.

Pricing starts at $425, based on the number of users concurrently accessing the system. Discounts are available.

Saros
10900 N.E. 8th St.
205 Plaza Center Building
Bellevue, Wash. 98004
206-646-1066

Local-area networking hardware

Lanier Business Systems has added an Intel Corp. 80386-based server to its 4300 Network series.

The Model III is a single-source personal computer network system that includes a Microsoft Corp. Xenix-based server and Lanier Network Services, a complete set of networking functions and software utilities. The Model III can support up to 32 personal computers and requires 36K bytes of each attached PC's memory. The server contains 2M bytes of random-access memory but can be upgraded to 16M bytes. It sells for $6,995.

Lanier Business Systems
2310 Parklake Drive, N.E.
Atlanta, Ga. 30345
404-270-2000

CMS Enhancements, Inc. has introduced The TM 250, a 250M-byte tape backup subsystem for networking systems, IBM Personal Computers, ATs and compatibles.

It reportedly incorporates a durable hardened plasma ceramic-coated tape head and electronics engineered specifically for use with extended-length data cartridges. The unit supports networking systems and provides full read and write capabilities for standard length tapes, the vendor said.

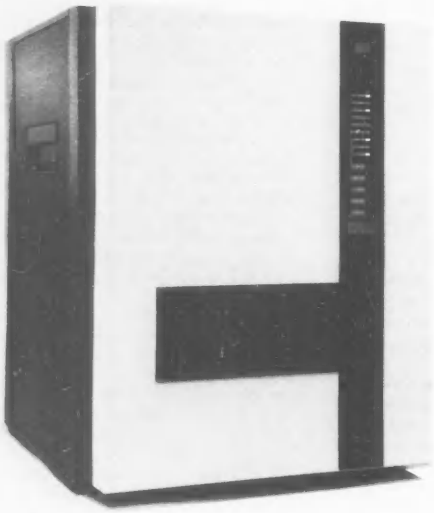
The internal half-height unit costs $1,495.

CMS Enhancements
1372 Valencia Ave.
Tustin, Calif. 92680
714-259-9555

Teleprocessing Products, Inc. has announced a line driver that allows terminal devices to be connected over distances of up to three miles at 256K bit/sec.

The TP-335 High Speed Line Driver operates from 56K to 256K bit/sec. and

Continued on page 69



T1 USERS

TRANSFER 6250 DATA AT 256KB OFF-LINE TAPE-TO-TAPE

Mitron's STD 6250 provides an efficient method for sending and receiving data anywhere in the world. STD 6250s communicate with each other and with other companies' bisynchronous terminals and computers.

The STD 6250 solves machine compatibility problems. It transfers data reliably without mailing tapes. It can communicate off-line to relieve an overworked computer.

STD 6250s transfer data at speeds up to 256KB. Double-buffering eliminates delays caused by read/write cycle times.

The STD 6250 can be leased or purchased.

STD 6250 features:
- Easy-to-install
- Needs no software
- Data rates to 256KB or faster
- RS-232 or V.35
- Dial-up or private line
- Multiplexers
- 6250 or 1600 bpi
- 1200', 2400', or 3600' reel sizes
- Bisynchronous protocol
- Transparent or non-transparent
- Space compression
- Variable size records to 32,000 bytes
- Labels and multiple files

STD 6250 options:
- Asynchronous
- Code conversion
- Modem eliminator

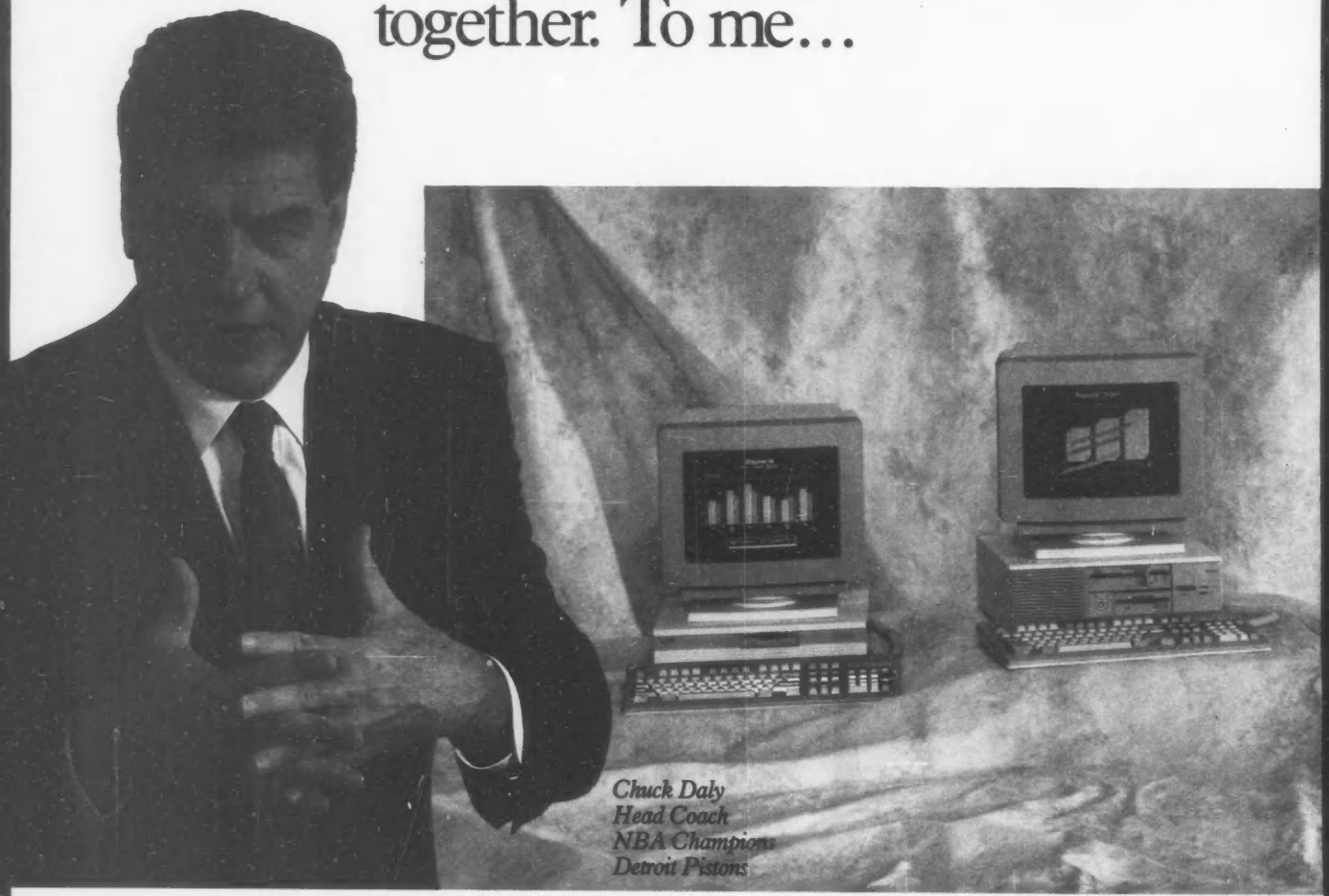
Over 100 Megabytes per hour at 256KB

Since 1969, Mitron's magnetic tape systems have been used in a wide variety of data communication applications. For more information on how the Mitron STD 6250 can be used to send or receive magnetic tape data files, call 800 638-9665 (in Maryland, 301 992-7700)

MITRON
Systems Corporation
2000 Century Plaza, Columbia, MD 21044

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Chuck Daly
Head Coach
NBA Champions
Detroit Pistons

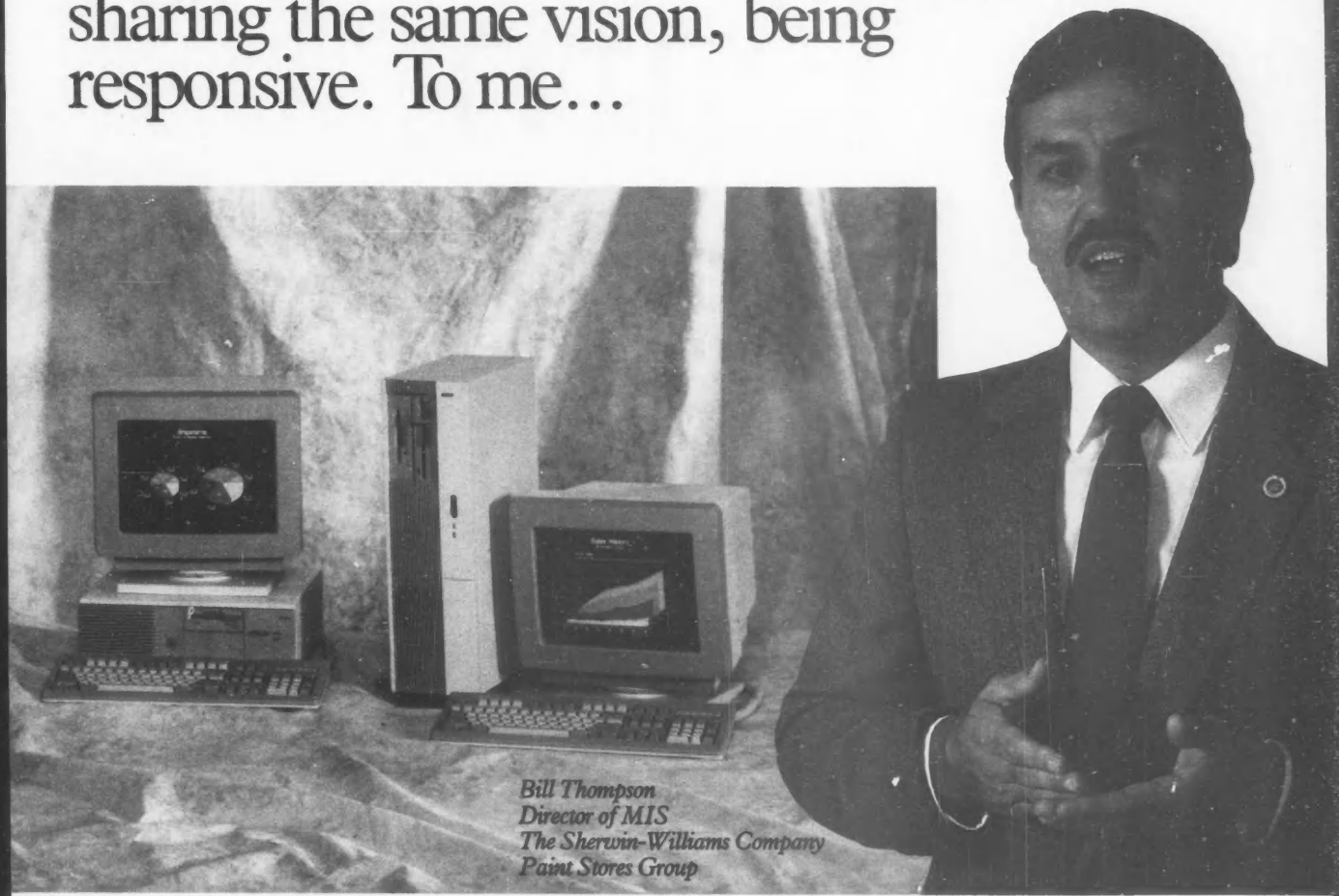
teamwork is

The result of teamwork on the court is championships. The result of teamwork in today's business arena is success. Marketshare battles are usually won or lost by a few points. And the difference usually comes down to teamwork. Everybody doing their part as part of a team.

NCR's new series of personal computers is designed for teamwork. They share information, applications, and network resources quickly and efficiently. So people can make better decisions and work together more productively as a team. And that gives your company the jump on your competition.

Many times the competitive edge comes from better execution of fundamentals. Fundamental to NCR's new series of personal computers is our enhanced implementation of industry standards that provide system flexibility and the potential for expansion. For example, our industry standard focus

"To be a quality organization you have to do more than make a compatible product. You have to get everybody working together, sharing the same vision, being responsive. To me...



Bill Thompson
Director of MIS
The Sherwin-Williams Company
Paint Stores Group

everything."

insures compatibility with both present and future business requirements. So you can utilize existing resources as you incorporate new technologies.

The new NCR PC286, PC386sx, PC386sx/MC, and PC386 give you the workgroup computing advantage you need to break away from your competition.

What's more—at NCR, teamwork goes beyond hardware and software. It extends to the quality of our relationship with our customers. To our dedicated service and support. To a solutions approach that is always open to individual needs.

And that's really the name of the game.

NCR PERSONAL COMPUTERS
Because Teamwork Is Everything.

The Starting Team.



The first four members of NCR's new team of PCs range from an entry-level Intel286™-based desktop personal computer to an Intel386™-based file management system. In the middle are two Intel386 SX-based personal computers that provide the performance of 386 technology at near 286 microprocessor cost levels.

Holding the team together is the NCR LAN Manager, an advanced operating system offering a comprehensive set of network management, administration, and diagnostic tools that provides functionality in both MS DOS® and OS/2™ environments.

Beyond the new hardware, NCR's open systems approach offers an enhanced implementation of practically all the industry standard tools for DOS applications as well as OS/2 for multi-tasking environments. NCR also offers the current Industry Standard Architecture while providing the forward-looking potential to switch to the reliability of Micro Channel™ Architecture (MCA) as your game plan evolves.

The result is a totally integrated system that is open to technological advancement. A system that is easy to administrate, capable of multi-tasking and, above all, a system that works as a team.

For information on this new team of personal computers, call 1 800 544-3333. Or write to us at P.O. Box 785, Dayton, Ohio 45482-9905.

NCR

Creating value

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Continued from page 64

features both V.35 and V.36 customer interfaces, the vendor said. The product is also said to include local and remote loopbacks, built-in pattern generation and detection and a complete set of front-panel indicators.

The driver was reportedly developed for campus environments. It sells for $695 per unit.

Teleprocessing Products
4565 E. Industrial St.,
Building 7K
Simi Valley, Calif. 93063
805-522-8147

Local-area networking software

Fibronics International, Inc. has upgraded its line of Transmission Control Protocol/Internet Protocol communications software with increased terminal access and electronic-mail capabilities.

According to Fibronics, the ASCII terminal emulation feature of KNET enables IBM 3270 terminal users to access an ASCII processor's applications. KNET's SMTP/VM feature reportedly provides exchange of electronic mail with IBM Professional Office System users.

The MVS version of KNET is priced at $25,000, and the VM Version 3.0 sells for $11,750, the vendor said.

Fibronics
Communications Way
Independence Park
Hyannis, Mass.
02601-1892
617-778-0700

Netwise, Inc. has announced that it has upgraded its C language software development package to support additional Sun Microsystems, Inc. equipment, Intel Corp 80286-based machines with The Santa Cruz Operation's SCO Unix, the Unisys U6000 machine with Unix and all Solbourne Computer, Inc. machines.

Called RPC Tool, the development package reportedly provides C language source code that enables transparent cooperation among applications in multivendor network environments. According to Netwise, versions have been completed for Sun-3 machines using SunOS 4 operating systems, Sun 386I machines using SunOS 3 and Sun-4 machines using SunOS 4. Prices range from $2,950 for the Sun 386i to $14,000 for the Sun-4.

Netwise
2477 55th St.
Boulder, Colo. 80301
303-442-8280

Links

Timeplex, Inc. has expanded its line of Timepac X.25 packet-switching products to include two synchronous packet assembler/disassemblers (PAD) and an enhanced nodal processor, the company said.

The TS40 PAD is said to offer four device ports, while the TS10 PAD provides one port. Both are stand-alone units that support device speeds up to 19.2K bit/sec. The 100E Nodal Processor was designed as an entry-level packet switch, the company said. It reportedly is capable of supporting up to 20 ports per unit with 100 packet/sec. throughput.

Pricing ranges from $3,400 to $6,900 for the TS10 and TS40 and from $5,000 to $9,000 for the NP100E. All prices are dependent on configuration.

Timeplex
400 Chestnut Ridge Road
Woodcliff Lake, N.J. 07675
201-930-4607

Simpact Associates, Inc. has announced that its line of Motorola, Inc. VMEbus-compatible wide-area connectivity products support AT&T's Unix System V operating system.

The VCI family of products reportedly includes support for the X.25 standard, the High-Level Data Link Control protocol, an Advanced Data Communications Control Procedures interface, Synchronous Data Link Control and link-level Digital Data Communications Message Protocol.

According to the company, each interface includes a Motorola 68020-based front-end processor, board-resident firmware, protocol software; a Unix-compatible host-resident driver, test routines and cabling.

Continued on page 70

SAA WORLD

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Jeffrey B. Tash

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  VP, Applications Systems Division
  IBM Corporation
  SAA Partnerships: Solution Creation and Implementation
- Thomas E. Furey, Jr.
  Site General Manager
  IBM Santa Teresa Laboratory
  SAA and the Application Development Environment
- Susan M. Whitney
  Director of SAA Marketing
  IBM Corporation
  SAA — IBM's Blueprint for the 1990s
- Frank H. Dodge
  President & CEO
  McCormack & Dodge
  SAA — Into the Next Millennium
- Howard Anderson
  Managing Director
  the Yankee Group
  IBM's New Strategic Weapon: SAA Executive Summary

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Index Technology Corp.
Information Science Inc.
Integral Systems
Interactive Images
Information Builders, Inc.
J.D. Edward & Company
KnowledgeWare, Inc.
MIDRANGE Systems
McCormack & Dodge
Management Science America, Inc.
MUST Software Int'l
Nastec Corp.
On-Line Software Int'l
Pansophic Systems, Inc.
Peregrine Systems, Inc.
Rice Consulting Company
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Pricing for the products ranges from $5,350 to $8,740.
Simpact Associates
9210 Sky Park Court
San Diego, Calif. 92123
619-565-1865

Protocol converters

Axis Communications, Inc. has introduced a stand-alone protocol converter that permits ASCII laser, matrix and non-impact printers to communicate with IBM midrange computers.

The AX-3 Cobra provides IBM printer emulation support, menu-driven programmability and support of 30 different ASCII printer banks, according to the vendor. The unit measures 5.5 inches in length and is 1.4 inches wide and 3.8 inches high. It is priced at $1,095.
Axis Communications
130 Center St.
Danvers, Mass. 01923
508-777-7957

Commtex, Inc. has introduced a five-port ASCII-to-3270 protocol converter.

Called the CX-81, the converter enables asynchronous ASCII displays, printers and personal computers to access two IBM 3270 mainframes, conducting up to five concurrent sessions with one or both hosts.

Each host communications line is said to independently support binary synchronous communications, IBM Systems Network Architecture or Synchronous Data Link Control.

The CX-81 emulates 3174 control units and supports more than 250 terminal emulations, the company said.

The unit retails for $3,295.
Commtex
1655 Crofton Blvd.
Crofton, Md. 21114-1305
301-721-3666

Gateways/Bridges/ Routers

Paradata Computer Networks, Inc. has announced gateway products for Bull H. N. Information Systems, Inc.'s mainframes and minicomputers.

A Netbios protocol version of the Bull Honeylan gateway connects Bull mainframes with any local-area network that supports the Netbios protocol, including networks from IBM, Banyan Systems, Inc., 3Com Corp. and 10Net Communications.

The asynchronous version of Bull Honeylan is said to enable linking via existing asynchronous connections for Novell, Inc. and Netbios networks. An X.25 gateway will be available in the second half of 1989, according to the vendor.

The synchronous gateways are priced at $2,995, $3,995 and $4,995 for eight, 16 and 32 sessions, respectively. The asynchronous product is listed at $2,995 for eight sessions.
Paradata Computer Networks
37525 Interchange Drive
Farmington Hills, Mich. 48331
313-478-8400

A communications gateway card has been announced by Data/Ware Development, Inc.

The DW601 PCgate reportedly provides IBM 3270-type communications control for IBM Personal Computer compatibles by emulating a 3274 cluster controller.

The card plugs into the PC to provide a resident gateway for high-speed data communications between an IBM mainframe and a local-area network's shared peripherals. It costs $4,450.
Data/Ware Development
9449 Carroll Park Drive
San Diego, Calif. 92121
619-453-7660

Front ends/ Multiplexers

Emulex Corp. has announced a communications coprocessor said to be designed primarily for IBM Personal Computers and ATs for use under multiuser operating systems such as Xenix and Unix.

Called the DCP/MUXI, the multiline serial card reportedly has shared memory interface, memory windows and two-way interrupts and is based on Intel Corp.'s 10-MHz 80286 microprocessor.

According to Emulex, the board supports eight full-duplex serial lines with synchronous clock support on two lines, and it can achieve line speeds as high as 19.2K bit/sec. for eight asynchronous lines or up to 64K bit/sec. on one synchronous line.

Pricing begins at $1,350.
Emulex
3545 Harbor Blvd.
P.O. Box 6725
Costa Mesa, Calif. 92626
714-662-5600

AEG Bayly, Inc. has added a multiplexer for thin-route network applications to its line of telecommunications products.

The DS3 Omniplexer reportedly allows direct access to DS0 and sub-DS0 voice and data channels directly from the DS3 facility. According to the vendor, this multiplexer is ideally suited for where multiple sites can access two to 24 voice or data channels along a single communications transmission pathway, thus replacing back-to-back M113 multiplexers and channel banks along a multipoint network. Prices begin at $8,000.
AEG Bayly
167 Hunt St.
Ajax, Ontario, Canada L1S 1P6
416-683-8200

Diagnostic equipment

Brightwork Development, Inc. has released local-area network diagnostic software that includes dial-in capabilities.

Arcmonitor and Emonitor can reportedly access a remote network using a personal computer and modem to measure activity levels, estimate resource utilization and isolate hardware faults. They are designed for use on LANs using Novell, Inc. Netware, Banyan Systems, Inc. Virtual Networking Software or IBM Netbios. The list price is $295 per file server license.
Brightwork Development
P.O. Box 8728
Red Bank, N.J. 07701
800-552-9876

Beckman Industrial Corp. has announced the TMT-1 Transmission Medium Tester for use in local-area network certification, the company said.

The unit reportedly measures 9.5 by 6.3 by 2 in. and weighs less than 5 lbs. It performs a series of electrical tests in automatic sequence or individually under operator control. The device is capable of testing both coaxial cable and twisted-pair LANs to detect shorts and open circuits, as well as impulse and noise on the line. The TMT-1 costs $3,200 and includes a two-year warranty.
Beckman Industrial
550 Harbor Blvd.
La Habra, Calif. 90631
213-690-7253

Electronic mail

Compuserve, Inc. has announced the interconnection of its electronic mail system with the Message Handling Service (MHS) from Action Technologies, Inc. and Novell, Inc.

The Infoplex-MHS connection reportedly provides a link between various MHS-compatible applications and Compuserve E-mail users, thereby allowing the exchange of messages and ASCII and binary files through a gateway established at Compuserve's host site.

Pricing options include a connect-hour per transmission version with a base rate of $3.75 per hour plus 20 cents per kilocharacter and open-port pricing with a base rate of $2,500 per month. Volume discounts are available, according to the company.
Compuserve
5000 Arlington Centre Blvd.
P.O. Box 20212
Columbus, Ohio 43220
614-457-8600

Modems

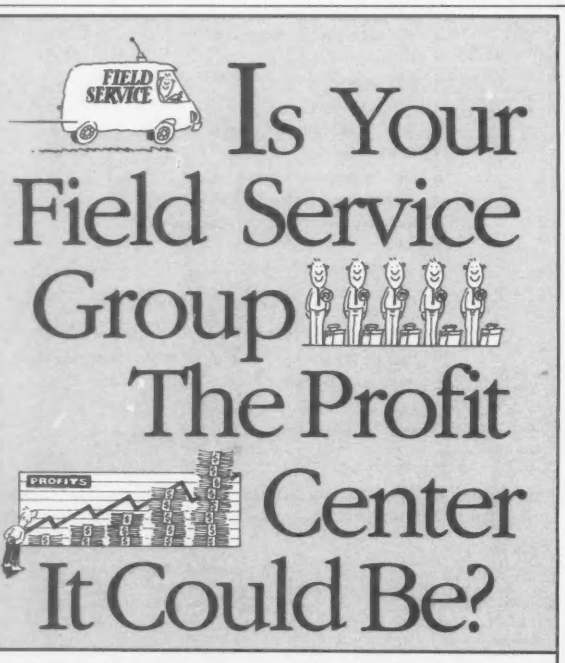
Compuquest, Inc. has introduced three new modems: a 4.8K bit/sec. cellular data modem, reportedly developed for use with cellular phones and offering error-correction capabilities; a V.33 leased-line modem with transmission rates up to 28K bit/sec.; and a V.32 9.6K bit/sec. modem.

The devices sell for $1,695, $3,495 and $1,595, respectively. All three of the products reportedly use a proprietary protocol for data compression and error correction functions.
Compuquest
801 Morse Ave.
Schaumburg, Ill. 60193
312-529-2552

Practical Peripherals has announced the PM 2400 PS/2, a 2,400 bit/sec. internal modem developed specifically for IBM's Personal System/2 series.

The device, a Hayes Microcomputer Products, Inc.-compatible product that plugs directly into the PS/2 IBM Micro Channel Architecture bus, features autoanswer as well as autodial capabilities.

It sells for $299.
Practical Peripherals
31245 La Baya Drive
Westlake Village, Calif.
91362
818-706-0333



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The DATA Group Corporation, 77 South Bedford Street, Burlington, MA 01803

If you're thinking of putting an IBM monitor on your PS/2, you're not seeing the big picture.



When it comes to displays, bigger is better. That's one reason why the Amdek Monitor/432 monochrome VGA has a big edge over IBM's own standard PS/2 monitor.

But it's not the only reason. Because the 432 is, after all, from Amdek. A company with over 12 years' experience in the computer monitor business, and the leading independent monochrome supplier.*

The 432's 14" etched-surface, flat screen produces hardly any glare or distortion. And far less eyestrain than Big Blue's PS/2 monitor with its smaller, 12" curved screen.

What's more, IBM's smaller screen also carries a bigger price tag.

So, if you're choosing a monochrome monitor for a PS/2 or any AT compatible, remember the company that hasn't lost sight of the big picture. Amdek. **For the dealer nearest you, call 1-800-PC AMDEK.**

AMDEK

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MIS/DP managers, applications development personnel, technical support personnel, end-users, and other professionals who must understand and anticipate software developments, and the market forces shaping the evolution of these technologies.

Vendors who need to understand their clients' wants and expectations.

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Robert Tasker, Vice President, Software Research Group, IDC

Outfitting The Cobblers Children - The Systematic Approach
Ed Acly, Program Manager, Software Technology Service, IDC

Emerging Technologies In The 1990s
Les Hellenack, Director, New Software Technologies, IDC

Executive Information Systems
Clare Gillan, Sr. Analyst, Software Research Group, IDC

Imaging Systems
Ken McPherson, Director, Software Research Group, IDC

Automated Operations - An Industry In Transtition
Robert Desautels, Analyst, Software Research Group, IDC

Case Study - Imaging
Charles Plesums, Director of Image Systems, USAA

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- IMAGING technology – applications available today and the direction for the nineties.
- The movement towards automated Executive Information Systems and Decision Support Tools; is EIS truly the wave of the future?
- Data Center Management Software – your best choices now and how to maximize the advantages for your data center.
- Distributed Data Base Management Systems – what will it take to bring this technology on-line in the nineties.
- Artificial Intelligence – Is the technology with the longest record of hype poised to be increasingly integrated with information systems in the nineties?

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International Data Corporation
5 Speen Street
Framingham, MA 01701

EXECUTIVE TRACK



John F. Devlin was named director of the systems management and operations services division of the **Internal Revenue Service** in Washington, D.C.

He is responsible for technical assistance on new automation technologies, monitoring regional, district and service center computer operations and computer capacity management.

A Philadelphia native, Devlin, 45, was chief of the computer services division at the IRS' Philadelphia service center since 1985. He joined the IRS in 1973 as a stabilization specialist in Washington. He holds a bachelor's degree in economics from Mount St. Mary's College in Emmitsburgh, Md., and a master's degree in computer management from American University in Washington.

.....

Robert A. Hunt has been elected managing director of **Bay Banks Systems, Inc.**, the firm that performs all data processing for Boston-based Bay Banks, Inc. Hunt will oversee the firm's central operations for retail and corporate banking, including electronic banking, data processing, technical support and check processing.

He was most recently senior vice-president of Irving Trust Co. in New York.

Hunt holds a bachelor's degree from Fairleigh Dickinson University and is a graduate of Stonier Graduate School of Banking and the executive program in business administration at Columbia University.

.....

Who's on the go?

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I'm OK; top management's so-so

Most IS professionals say they're happy but worry about communications gap

BY DAVID A. LUDLUM
CW STAFF

Consultants and academicians often harangue information systems managers about the need to understand their company's business better. The message probably should be directed at top management instead, according to *Computerworld's* third annual Job Satisfaction Survey.

When asked if knowledge of their company's business is becoming more important to them, 90% of the IS professionals said yes. But half of them said they are not satisfied with their company's efforts on that score.

"If the business direction is going to change in a year, then my job would be made much easier if I knew that up front," says Mel Mitchell, a systems manager at Humana, Inc., a Louisville, Ky.-based health care company. "Systems built three years ago are obsolete because the systems staff was not made aware of what was going to happen."

In a similar vein, the IS professionals agreed that opportunity for advancement is an important issue that often generates dissatisfaction. Fifty-eight percent said IS does not provide the right opportunities to advance to upper management.

Indeed, while IS professionals struck a positive tone — more than half said they are satisfied or very satisfied with their jobs — their dominant concern seemed to be a perceived chasm between themselves and top management.

When asked what they like least about working in IS, respondents overwhelmingly pointed to poor communications with management or a lack of recognition by management (see chart page 74). Also on the list was a faulty perception of IS people and organizations.

When asked what messages they would like to pass along to top management, respondents most often said "improve communication, interaction and teamwork." Other popular requests included appreciating IS personnel more as well as listening to and motivating them.

The communication gap between IS professionals and top managers stems from differences in their disciplines and personalities, says Daniel Eshoo, data processing manager at Industrial Tools, Inc. in Ojai, Calif.

"Management really doesn't have an appreciation for what it takes to make things happen in the DP world," Eshoo says. At the same time, IS managers can be narrowly focused on their tasks. "Frequently, it's not being able to see the forest for the trees," he says.

Overall, however, the IS professionals firmly agreed that they work in an exciting field. When asked which aspects of it they find most rewarding, they were most likely to cite challenge, variety and change. "The constant change keeps you active, thinking; you stay innovative because you're forced to," says Dennis Wessel, DP coordinator at Mid-State Technical College in Wisconsin Rapids, Wis.

Also high on the list of positive attributes were working with technology and solving problems. "It's just real obvious to me and, I think, to a number of our end users, how important automation is in providing services to the citizens of our county," says Robert Stuckey, IS director for Monterey County in Salinas, Calif. He cites the example of a computer-aided dispatch system for police, fire and other emergency services.

While IS professionals thrive on change, that change also underlies some of the frustrations they said they encounter. "Although you want change, you want a feeling of having some control over that change," Wessel says.

"Sometimes, change is a two-edged sword," Eshoo says. "We like to sit back and enjoy the fruits of our labor but don't have a chance because things are constantly coming at us, in technology and in business."

Other aspects of their work IS professionals said they like least was stress, pressure and burnout. Also on the list were long or odd hours and unrealistic deadlines.

The IS manager works in a world of negative feedback, says Edward Novak, MIS director at Value Line, Inc., an investment firm in New York. "Every time the phone rings, there's a problem. Seldom does anyone call with thanks," Novak says.

Such difficulties are multiplying with the proliferation of computers and increasingly complex technologies, Novak adds: "The number of things that can go wrong has gone up exponentially. The level of firefighting has increased."

Mitchell, who supports Humana's marketing department, is troubled by deadlines.

"The department tends to make changes to meet the challenge of competitors, and sometimes things have to be implemented quite rapidly," he says. "The goal is beating the competition to the punch."

Common frustrations of IS professionals also include lack of resources and a lean staff. Messages for management include spending more money on equipment and staff and increasing pay.

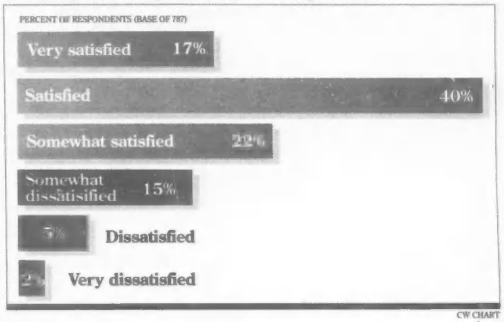
Mitchell says he believes some top managers would be more forthcoming with resources if they were closer to day-to-day operations.

Another concern the IS professionals repeatedly pointed to is a lack of adequate planning by management. "Strate-

To page 74

How satisfied are you?

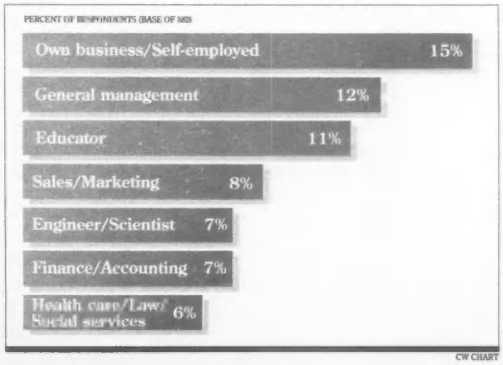
More than three-fourths of IS managers and professionals surveyed are at least somewhat satisfied with their current positions



CW CHART

If they had their druthers...

Among those who have considered changing professions, most would prefer to be their own boss



CW CHART

Secret lives

Computerworld's third annual Job Satisfaction Survey refutes the notion that IS professionals are job-hoppers. A small majority of the respondents said they have worked for only one company in the last five years, and another 30% said they have worked for only two firms in that time. In the last 10 years, 30% of the respondents said they have worked for one company and 30% for two.

Furthermore, four-fifths of IS professionals said they are not actively seeking another job. Of the rest, 12% said they are actively looking for one, while 8% said they are always looking for job opportunities.

Slightly more than half the respondents (53%) said they have considered changing professions, although two-thirds of this group said the chances of doing so are slim to none.

The most frequently desired career alternative is self-employment or owning a business. John Risco Jr., manager of international systems at Cobe Laboratories, Inc. in Lakewood, Colo., has run a business delivering restaurant meals and says operating a small business full-time would involve decisions that directly affect his life. "I could mold my own destiny," he says.

The second most popular alternative is general management. Lanny Leathers, director of MIS at The Estes Co. in Tucson, Ariz., says he wouldn't mind being a litle removed from IS, without responsibility for bringing up a crashed system or correcting software errors. "That would take away the pressure for a 10-minute response time," he says.

Number three is education. Mel Mitchell, a systems manager at Humana, Inc. in Louisville, Ky., did a semester's worth of teaching through a program at his former employer, Mellor Bank in Pittsburgh. But Mitchell is among the majority of the IS professionals who said the chances of making a switch are slim. A career as a college teacher, he says, would require a Ph.D. and a pay cut. "Based on those two barriers, I wouldn't do it," he says.

The Job Satisfaction Survey was conducted by the Research Services division of IDG Communications, Inc. in Framingham, Mass., in June. Of 2,000 questionnaires mailed, 818, or 41%, were returned. The respondents range from programmers and systems analysts to vice-presidents of IS.

Satisfaction

CONTINUED FROM PAGE 73

gic planning is sort of the red-headed stepchild of the corporation," says Mickey Hutchins, director of MIS at the North Carolina Department of Crime Control and Public Safety in Cary, N.C.

"I think a lot of lip service has been paid to planning in general and MIS planning in particular," Hutchins says. "One of the reasons strategic plans gather dust on shelves is because no one takes the time to translate them into tactical and operating plans."

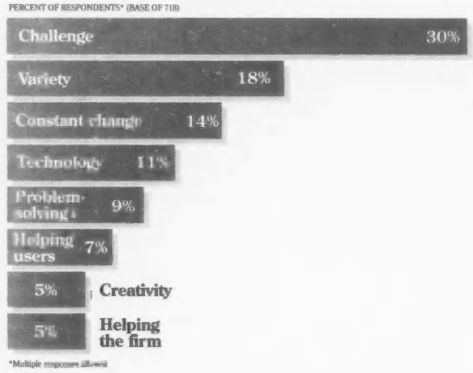
Another frequently cited frustration was office politics. Stuckey says that a "blurring of responsibilities" with the growth of end-user computing has raised the level of political conflict for IS people. "There are some organizations that think they have to own the equipment and have it in their area," he says. Stuckey says he believes such problems should ease as connectivity improves.

Another area the respondents called important but a source of dissatisfaction was nonmonetary recognition. "There's no money in the world that will make you happy," Wessel says. "If more organizations would give out a pat on the back more freely, I think they'd have a happier work force."

What do you like most about IS?

Among the chief attractions to working in IS, technology comes before helping users

PERCENT OF RESPONDENTS* (BASE OF 718)

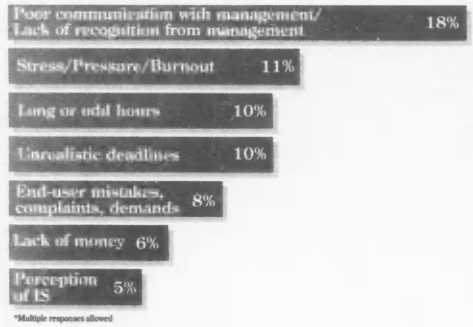


*Multiple responses allowed

What do you like least about IS?

Poor communication with management tops the list of complaints

PERCENT OF RESPONDENTS* (BASE OF 638)

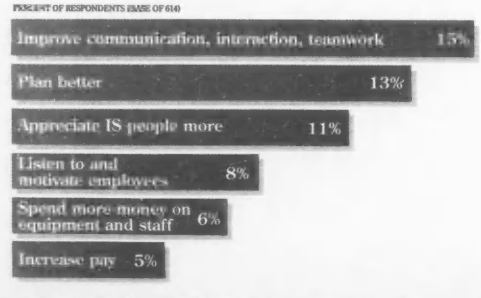


*Multiple responses allowed

Sending out an SOS

"Improve communication" is the one message most respondents would send to top management

PERCENT OF RESPONDENTS (BASE OF 614)



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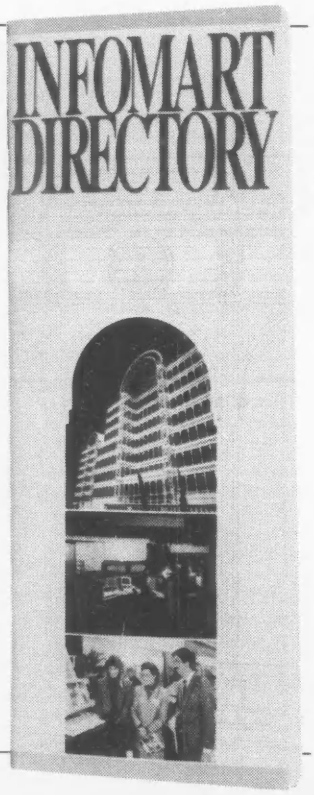
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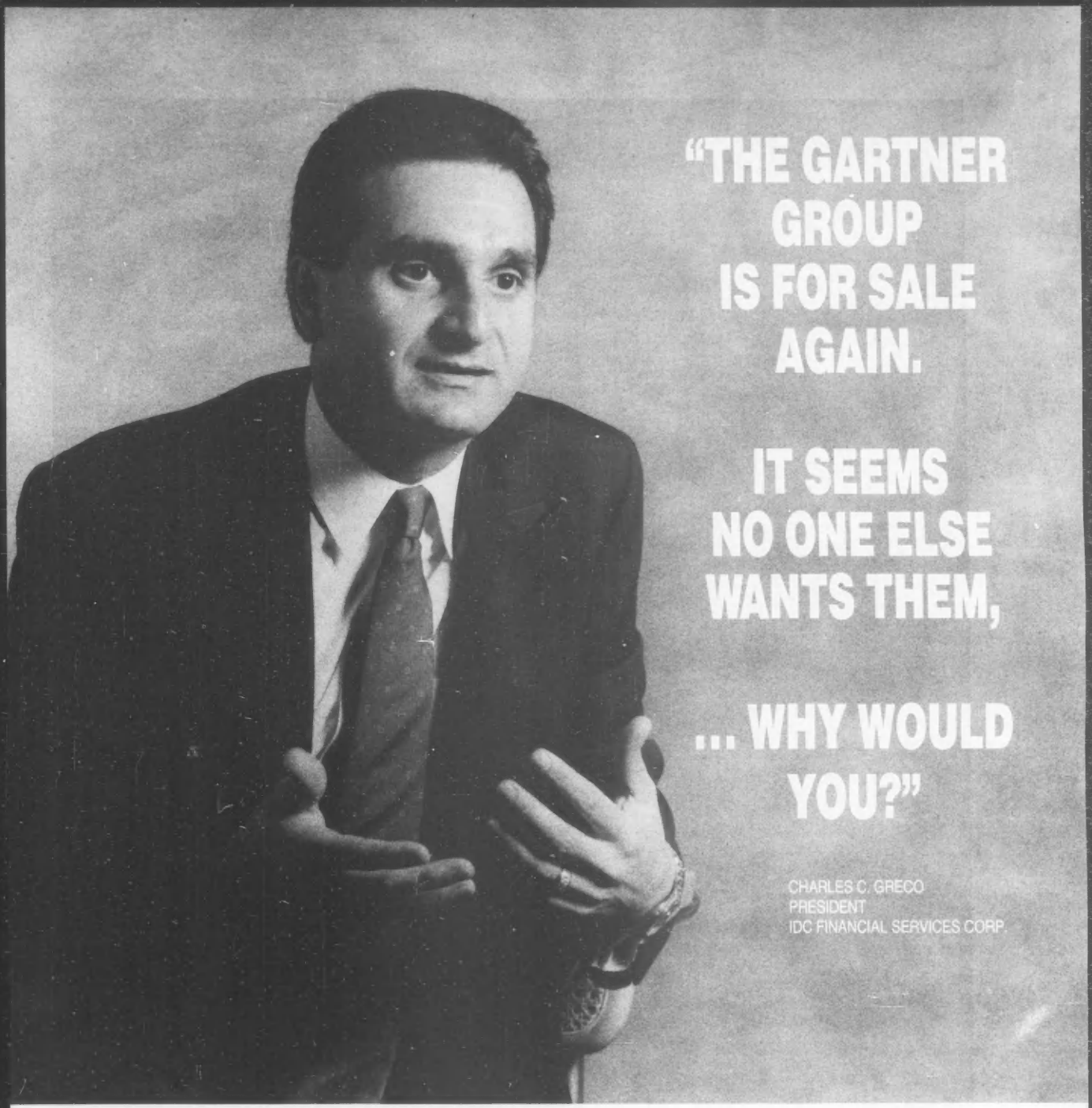
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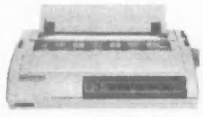
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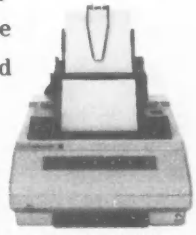
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C&C Computers and Communications

Strike provides unique test conditions for Pactel manager

BY ALAN J. RYAN
CW STAFF

SAN RAMON, Calif. — Resourceful people make the best of almost any type of situation. And Donna Ball, for one, is resourceful.

Ball, a Pacific Telesis Group employee, found herself acting as a customer service representative when the Communications Workers of America were on strike recently at Pacific Bell. Ball's usual position as an information systems project manager was put temporarily on hold.

However, Ball, whose group is developing Starwriter, an application for the service representatives, threw herself into the situation with few complaints because it gave her a chance to test out Starwriter from a new perspective and under difficult circumstances.

Starwriter is currently in a pilot-test phase at one of Pacific Bell's facilities in Oakland. It is an English language front-end system designed to make service representatives' jobs easier, according to Ball.

While no one looked forward to the strike, Ball said that for an application developer, the strike provided a unique opportunity to use the pilot Starwriter system during a hectic period.

"We were able to identify some significant upgrades [needed for] the product in a very short period of time just by having the ability to use it during the strike," she said.

Even those close to the system learned a great deal about it by using it during the strike, Ball said. "The work stoppage gave us probably more insight than we could have ever done in any type of lab environment or development environment by having the practical experience of using it with customers."

Currently, the representatives use a code system for issuing service orders for new or changed residence telephone service. Starwriter takes the English commands and translates them to code.

Additionally, it provides an on-line calculation of rates and charges, ensures that the representatives do not forget any pertinent items to discuss with the customer and provides product and service availability based on an address validation function.

"That way service reps are not put into a position of offering a product to a customer that is not available in that area," Ball said. That problem occurs with the current paper system, she added.

Starwriter will be rolled out to other offices beginning in October, Ball said, and all of Pacific Bell's residence offices are expected to be converted to the system by May 1990. By the time the Pacific Bell CWA workers start thinking about a new contract in three years, Starwriter will be in place at all of the Pacific Bell locations, Ball said.

The system has brought about some concerns from the service reps, though, who fear that the easier-to-use system could affect their job security, Ball admitted. However, those fears are unfounded, she claimed: "It will allow them to do more and will give them the opportunity to spend more concentrated time with their customers instead of worrying about how to get an order into the system."

The Pru moves to remote service

BY CHARLES VON SIMSON
CW STAFF

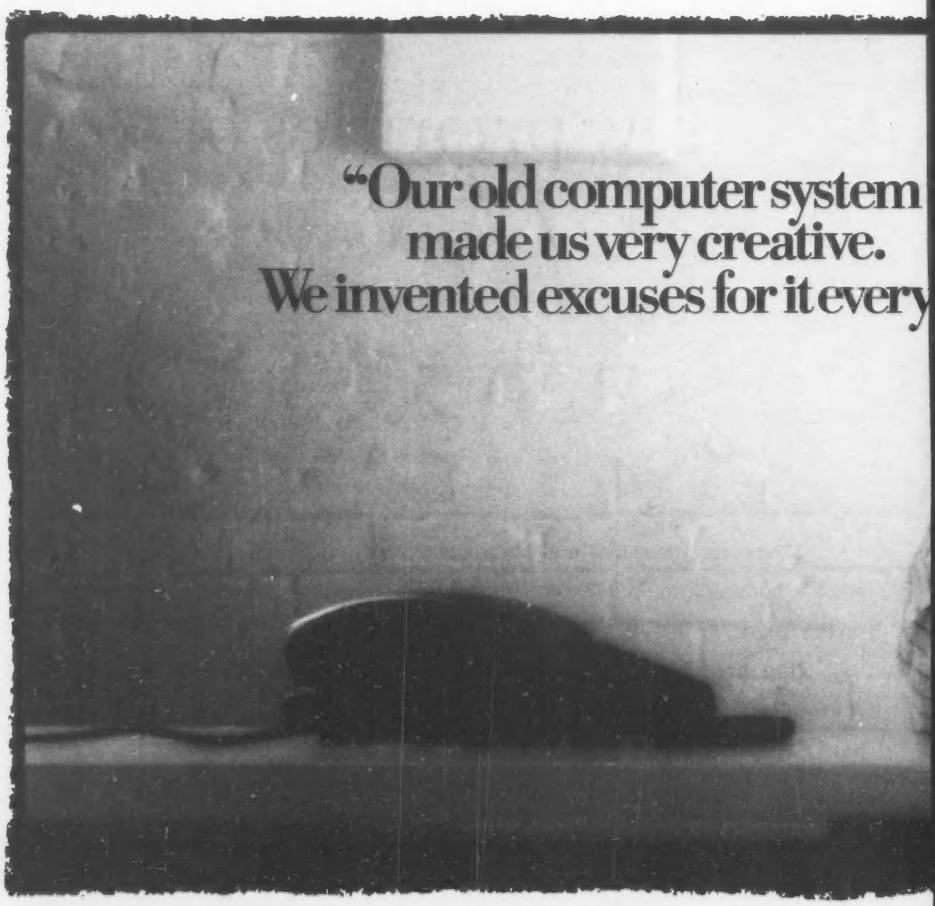
WOODLAND HILLS, Calif. — The Prudential Insurance Co. of America recently closed one of its four regional data centers, eliminating the data center that served its users on the West Coast. The move is expected to save the company $1.5 million per year.

The company made its planned transition over the July 4th holiday weekend, dumping resident data into an identically configured system at the company's larger Minneapolis data center.

"With advances in data communications, we are able to serve Western users from a remote data center," said MIS director Malcolm MacKinnon. "The Western center was small, and we felt we could do a more economical job of serving them from Minneapolis."

The savings will come from several areas, including staffing reductions and plant space. But most significant will be better use of mainframe capacity. All but seven of the 50 people employed at the closed data center accepted jobs at one of the three other data centers or in other departments at the Woodland Hills office.

The Prudential had an IBM 3084 mainframe in Woodland Hills and needed to migrate to a 3090 in order to use the functionality of IBM's Enterprise Systems Architecture. "Minneapolis had excess 3090 capacity that we are able to use," said Al Avigliano, general manager of the Woodland Hills site. "That saved the need for another machine. The 3084 was shipped to another data center."



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TAKING CHARGE

William Brittain

The many faces of teamwork

What do you think of when you hear the word "teamwork?" I asked that question to several co-workers, taking care to ask an equal number of men and women.

The most frequent responses were comments such as "working together toward a common goal," "getting along with each other," "communicating well" and "looking out for each other." It almost sounded like a community publicity campaign or a description of a close family, but it was not what teamwork is in other professions.

One person said teamwork was working together to accomplish what no one person could accomplish alone. That's more to the point. Teams are well-organized, multidisciplinary groups of people that rely on the talent or skill of individual members to accomplish what none could accomplish alone.

Sports teams are obvious examples, but there are others such as medical/surgical teams and exploration teams. All of these groups require individuals to fill certain roles that contribute to the common team goal.

Some sports teams, however, such as the U.S. Ski Team, are groups of persons with the same or similar skills. Calling these groups "teams" means something very different from calling multidisciplinary groups teams. Teamwork for the U.S. Ski Team means something fundamentally different from teamwork for a surgical team. With all of the talk about the importance of teamwork, we should make sure we're talking about the same thing.

Within information systems shops today, teams are typically organized like the ski team, consisting of people who have virtually the same skills and responsibilities. These teams have no intrinsic basis for interaction other than to share the work load and meet social needs. They are usually organized by numbers, grouping as many people together as can be reasonably "managed." They exist as a team as much for ease of administration as anything else.

The biggest problem that these teams encounter is communicating and interacting with other teams. The solutions that are usually offered are classes in effective communication and a recognition of the need for better coordination. That usually means that the manager has to attend more meetings with upper management and make sure status reports are up-to-date.

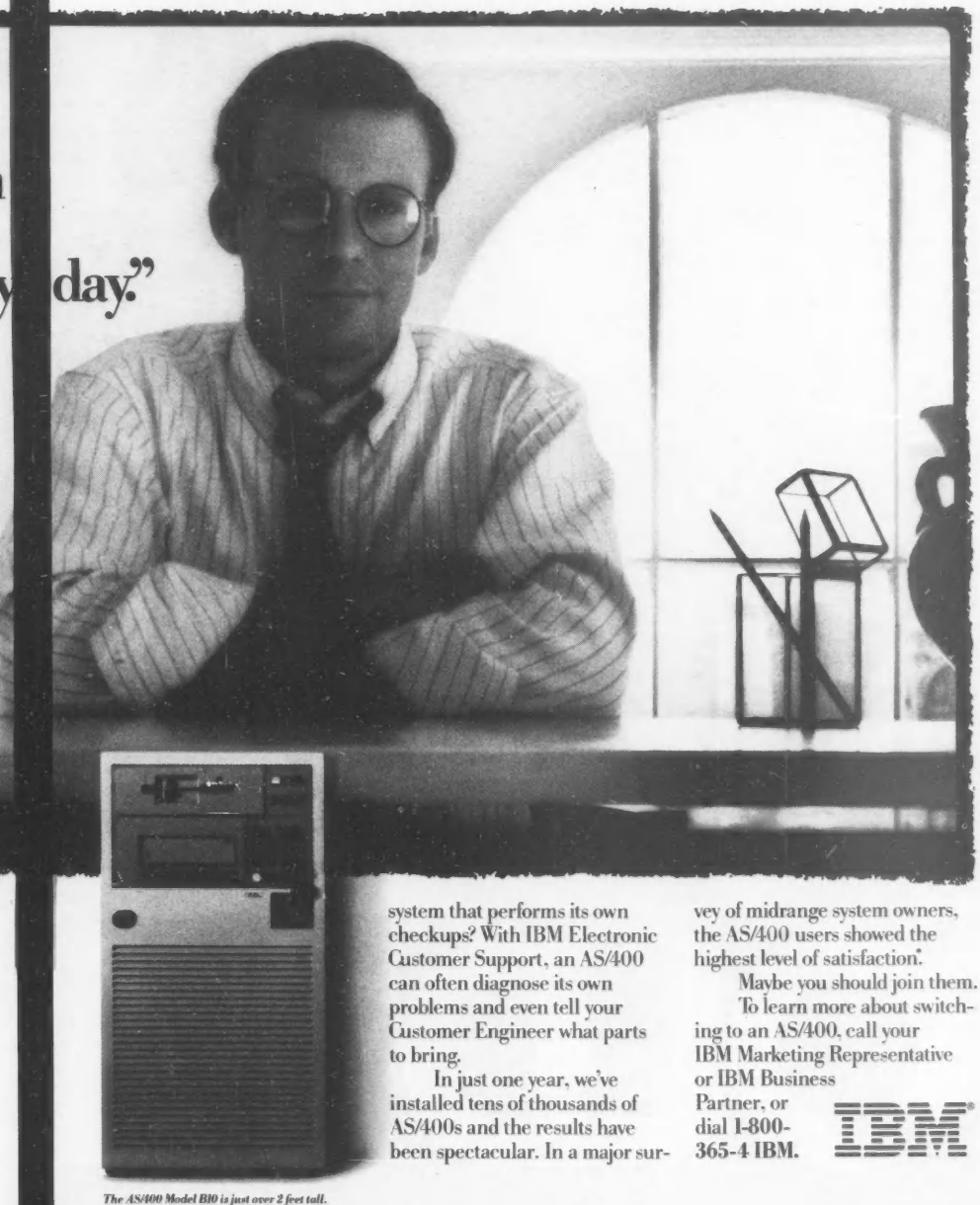
Multidisciplinary teams are, for the most part, self-managing. Team members interact and communicate out of necessity to accomplish a goal. Their primary emphasis is performance in the achievement of team goals.

In the future, IS shops will have to develop multidisciplinary teams to compete effectively. Managing these will require a much different orientation. Comparing the management of homogeneous teams with that of multidisciplinary teams is like comparing apples and oranges. However, because we use the same words to describe both types of teams, we think of them as the same. The result is misunderstanding, frustration and unmet expectations.

The people I asked about teamwork thought of it primarily as getting along well with others. That response is based on their organization. I'm sure that if I had asked what makes a football team a team, they would have given a different response. What does your organization think teamwork is, and why does it think that?

These are easy questions to ask — and well worth the effort.

Brittain is a senior programmer analyst at Capital Holding Corp. in Louisville, Ky.



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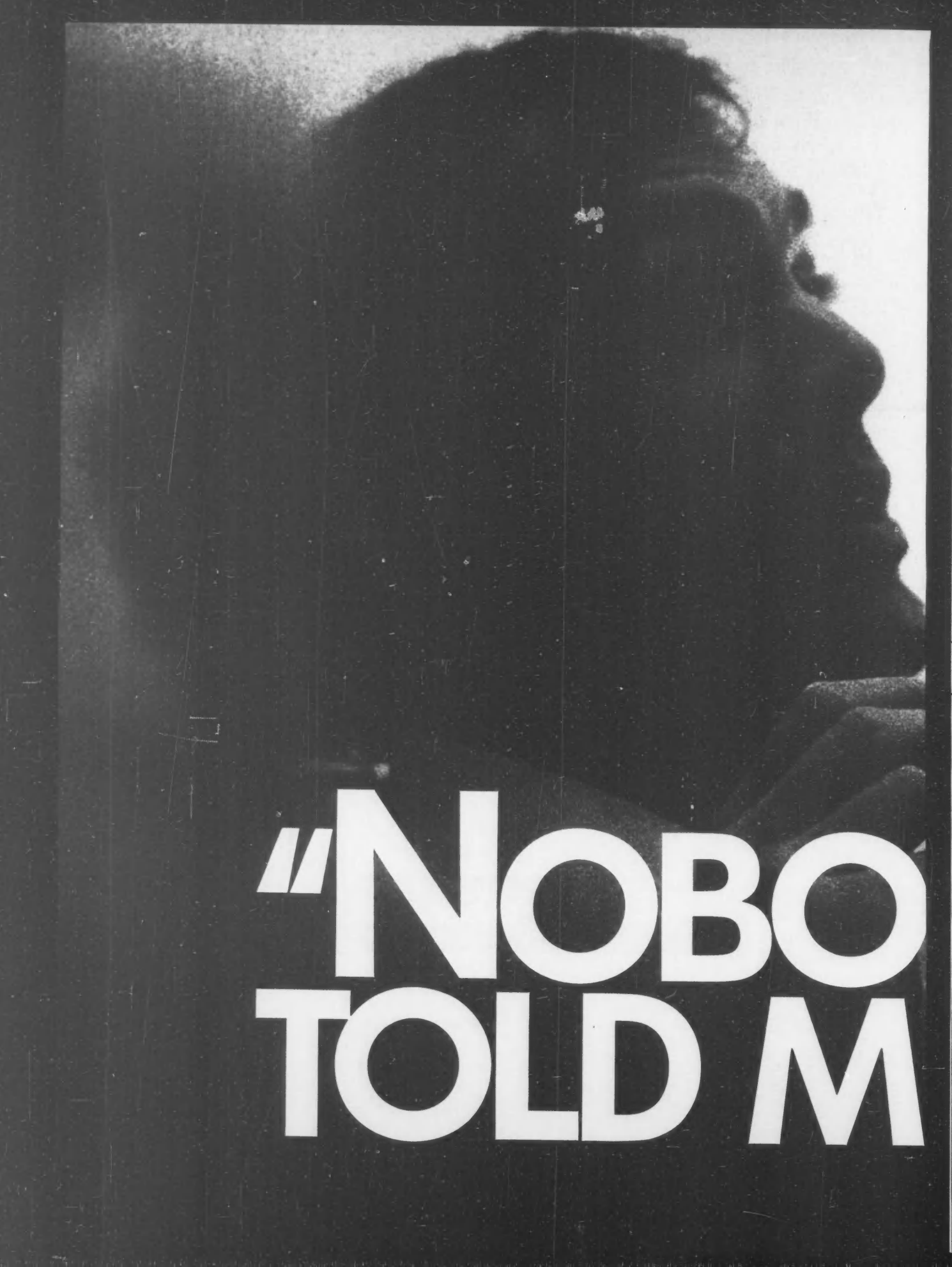
Meritbanc turns to Citicorp for service bureau

HOUSTON — Meritbanc Savings, a $320 million savings and loan institution, recently announced that it will convert its processing to Citicorp Information Resources' data center in Arlington Heights, Ill.

The conversion, targeted for next February, will replace Meritbanc's current service bureau, whose name it declined to disclose. Citicorp's service bureau processing system, called National Service Product, will provide Meritbanc with customer information file support, loan systems, transaction systems, financial management systems and deposit systems.

Houston-based JRS, Inc. will perform item capturing for Meritbanc as a third-party vendor.

Separately, the U.S. Health Care Financing Administration announced a $56 million contract with Allied-Signal, Inc.'s Bendix Field Engineering division to manage and operate its computer system for five years. The agency is based in Baltimore.


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Keynote speakers will be Patricia MacConaill, a divisional head at Esprit CIM, representing the Commission of the European Communities; and Regina Vargo, director of the Office of Industrial Trade of the U.S. Department of Commerce.

For more information, contact CAM-I Conference Services, Suite 500, 1250 E. Copeland Road, Arlington, Texas 76011.

SEPT. 17-24

American Bankers Association National Bank Card Conference. Nashville, Sept. 17-20 — Contact: American Bankers Association, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

International UFO-Cobol/XE User Group Meeting. Baltimore, Sept. 17-20 — Contact: On-Line Software International, Fort Lee Executive Drive, Fort Lee, N.J. 07024.

Lasers in Graphics and Electronic Design in Print Conference. New Orleans, Sept. 17-21 — Contact: Electronic Design in Print '89, Suite 1, 1855 E. Vista Way, Vista, Calif. 92084.

Disk Array Forum. San Jose, Calif., Sept. 18 — Contact: Technology Forums, Suite 260, 80 W. 78th St., Chanhassen, Minn. 55317.

End-User Computing: Managing the Demand. Washington, D.C., Sept. 18-19 — Contact: Karten Associates, 40 Woodland Pkwy., Randolph, Mass. 02368.

Laptop '89. New York, Sept. 18-19 — Contact: Laptop Expositions, 35 Fadem Road, Springfield, N.J. 07081.

CASE Symposium. Washington, D.C., Sept. 18-20 — Contact: Digital Consulting, 6 Windsor St., Andover, Mass. 01810.

Data Storage Forum. San Jose, Calif., Sept. 18-20 — Contact: Forum Management, Cartlidge & Associates, Suite 202, 3097 Moorpark Ave., San Jose, Calif. 95128.

Electronic Data Interchange Conference and User Group Meeting. New Orleans, Sept. 18-20 — Contact: American Petroleum Institute, P.O. Box 33485, Washington, D.C. 20033.

Long Range Information Systems Planning. San Francisco, Sept. 18-20 — Contact: Vern Lautner, 135 W. 50th St., New York, N.Y. 10020.

Marketing Services Conference. New York, Sept. 18-20 — Contact: Kotch & Polak, 708 Third Ave., New York, N.Y. 10017.

Midwest DB/DC Users Group Conference. Grand Rapids, Mich., Sept. 18-20 — Contact: Midwest DB/DC Users Group, Suite 3100, 3000 Town Center, Southfield, Mich. 48075.

Windows and Graphics Conference. San Francisco, Sept. 18-20 — Sun Microsystems, 2550 Garcia Ave., Mountain View, Calif. 94043.

Control, Audit & Security of IBM Systems. Chicago, Sept. 18-21 — Contact: Pamela Bissett, MIS Training Institute, 398 Concord St., Framingham, Mass. 01701.

North American Data General Users Group Conference. New Orleans, Sept. 18-21 — Contact: North American Data General Users Group, Turnkey Publishing, Suite 3150, 4807 Spicewood Springs Road, Austin, Texas 78759-9924.

The User's Role in Software Development. Cincinnati, Sept. 19-20 — Contact: Tom Nawrocki, Applied Information Development, 823 Commerce Drive, Oak Brook, Ill. 60521-1919.

Auto-Tech 89. Detroit, Sept. 19-21 — Contact: Automotive Industry Action Group, Suite 200, 26200 Lahser Road, Southfield, Mich. 48034.

Executive Information Systems Seminar. Atlanta, Sept. 19-21 — Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

Network Management and Control Workshop. Tarrytown, N.Y., Sept. 19-21 — Contact: Ted Lehrman, Center for Advanced Technology in Telecommunications, Polytechnic University, 333 Jay St., Brooklyn, N.Y. 11201.

Systems 3X Expo. Toronto, Sept. 20 — Contact: Systems 3X Expo, 27 Congress St., Salem, Mass. 01970.

Tools for Gaining and Keeping Upper Management Support for Information Centers. Beltsville, Md., Sept. 20 — Contact: Workshops, Cue Consulting, 13841 Palmer House Way, Silver Spring, Md. 20904.

Two Sides of Systems Integration: Market Trends & Buyer Perspectives. San Francisco, Sept. 20 — Contact: International Data Corp., 5 Speen St., P.O. Box 955, Framingham, Mass. 01701.

Staying Ahead of the Technological Change: The IS Management Challenge of the 1990s. New York, Sept. 20-21 — Contact: Mariana Levy, Business Week Executive Programs, 36th Floor, 1221 Avenue of the Americas, New York, N.Y. 10020.

Computer Security and Virus Symposium. Tyngsboro, Mass., Sept. 20-22 — Contact: Wang Institute of Boston University, Special Programs, 72 Tyng Road, Tyngsboro, Mass. 01879.

Computer Publishing Conference and Exposition. San Francisco, Sept. 20-23 — Contact: Seybold Seminars, 6922 Wildlife Road, P.O. Box 578, Malibu, Calif. 90265.

Computers and Communications: Sharing the Vision. San Diego, Sept. 21 — Contact: CMP Publications, 600 Community Drive, Manhasset, N.Y. 11030.

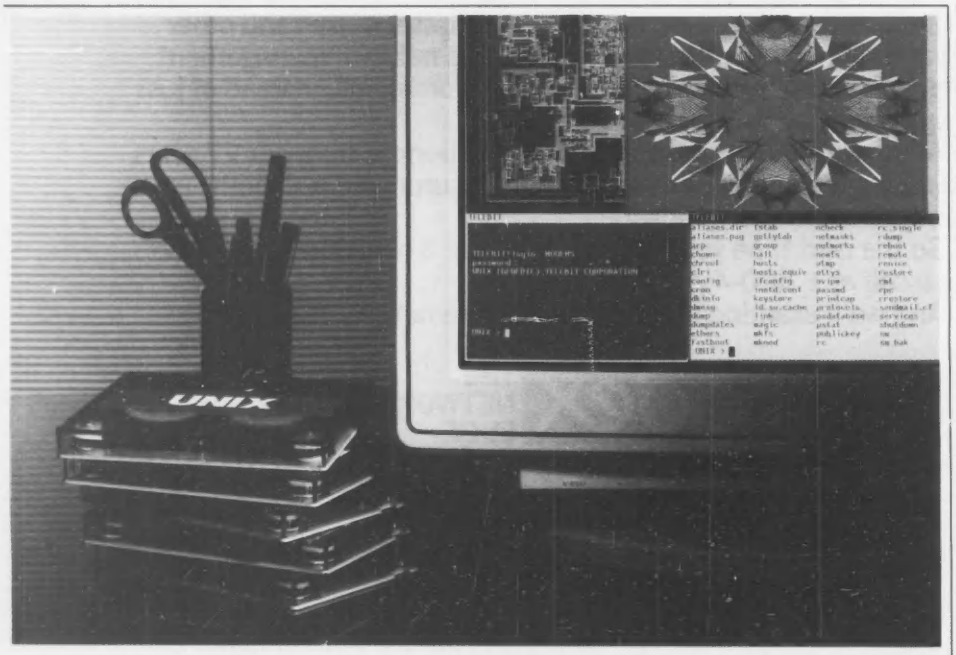
Systems Application Architecture Seminar. Boston, Sept. 21 — Contact: McCormack & Dodge, 1225 Worcester Road, Natick, Mass. 01760.

Microprocessor Forum. San Jose, Calif., Sept. 21-22 — Contact: Microprocessor Report, Suite 320, 550 California Ave., Palo Alto, Calif. 94306.

Product Development and Management Association Conference. Wellesley, Mass., Sept. 22 — Contact: Robert J. Kopp, Marketing Division, Babson College, Box 2152, Wellesley, Mass. 02157.

Applefest '89. San Francisco, Sept. 22-24 — Contact: Cambridge Marketing, One Forbes Road, Lexington, Mass. 02173.

Society for Information Management 1989 Conference. Atlanta, Sept. 24-28 — Contact: SIM Headquarters, Suite 600, 111 E. Wacker Drive, Chicago, Ill. 60601.



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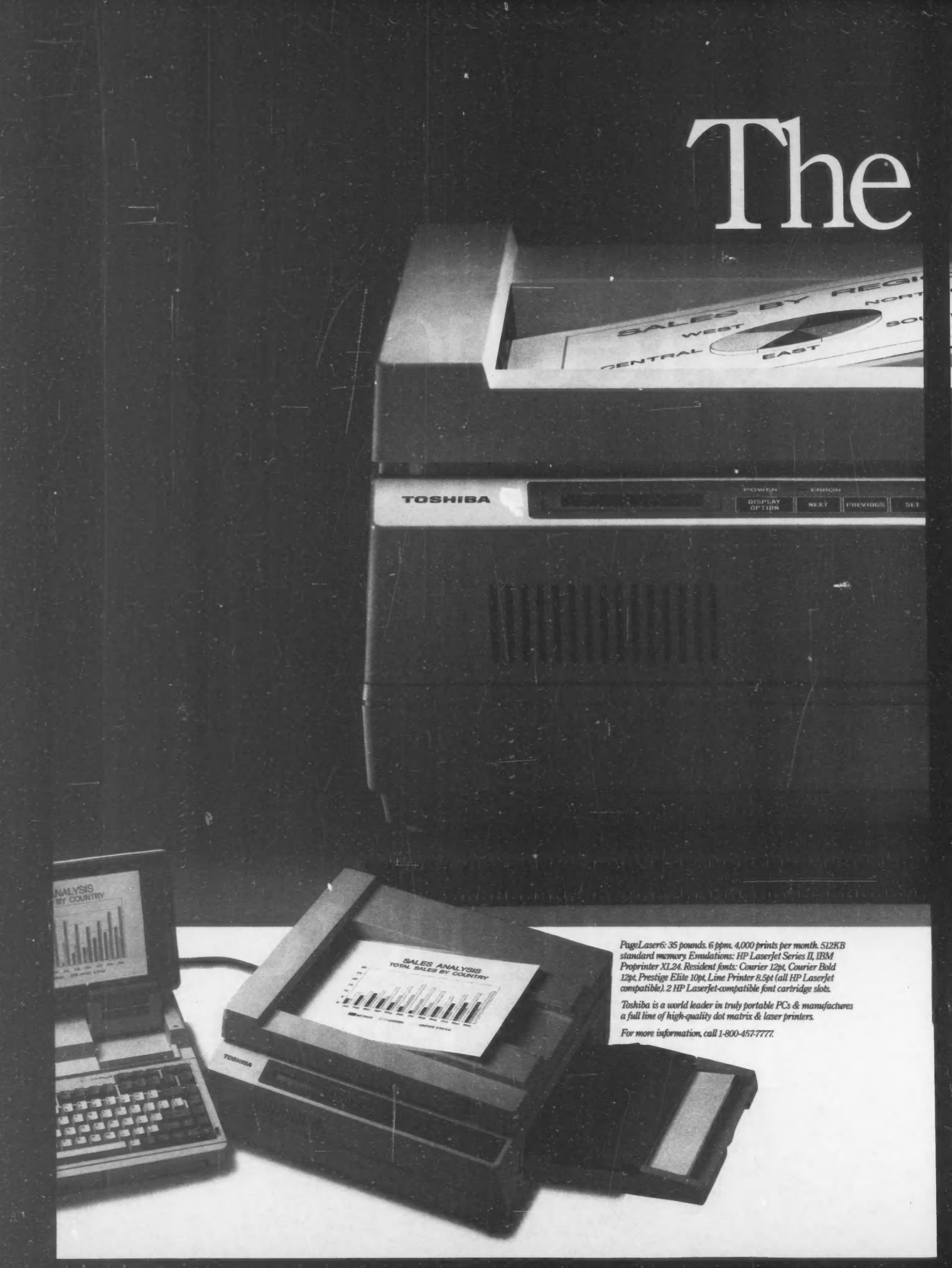
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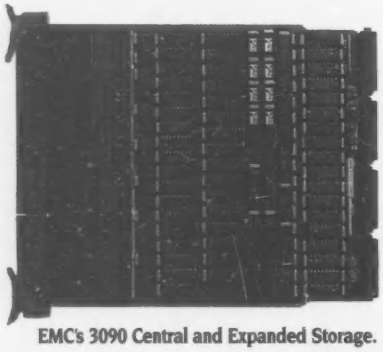
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Shopping around for interoperability

IS leans a little harder on vendors to make systems more compatible

BY DAVID H. CROCKER

Although most people agonize over the purchase of an automobile, the actual risk that they will buy something entirely inappropriate for their needs is quite small. Automobile technology is fairly well understood, and people buying cars know what functions they need the vehicle for. Of course, they may not necessarily know how an automatic transmission works, but they do not need to.

Such is not yet the case on the highways of interoperable networking. Much of the technology is quite new to the commercial world. Vendors are still learning about engineering trade-offs, and the information systems community is still learning to distinguish basic features from the chrome-finished applications.

The pressure from IS for interoperability among products from different vendors is intended to simplify the use of computers for organizational communications and reduce the cost of the related functions. While it does appear that the costs of many functions have been reduced, what has emerged is an independent technology. The operation of such heterogeneous systems can become far more complicated than when there is a single vendor.

As with a single computer that uses third-party add-on products, each vendor will naturally assume that any problem is the responsibility of the other vendor. Further, the dynamics of network communications mean that it is often difficult to reproduce and isolate interoperability problems.

Business often has had to solve these types of problems. For example, in the early days of telephones, there were multiple local companies, each with its own set of wires, and customers of one company could not talk with customers of another. As a result, some people had several telephones on their desk. Eventually, a single company, AT&T, was allowed to become a monopoly throughout most of the country so that until the early 1980s, people were able to forget about the difficulty. Of course, some would say that telephone communications has become difficult again.

In any case, no matter how much the current contenders would like to do it, solving interoperability problems by eliminating competing companies is not really an available option. Thus, standards have been established to ensure a necessary level of predictability and cost-effectiveness. In other cases, each vendor develops its own conventions, and IS must learn all of the idiosyncrasies of the vendor's products.

In the realm of computer communications, the situation is particularly extreme. Since each vendor implements its own standards, no two vendors' products can be expected to share data or otherwise cooperate.

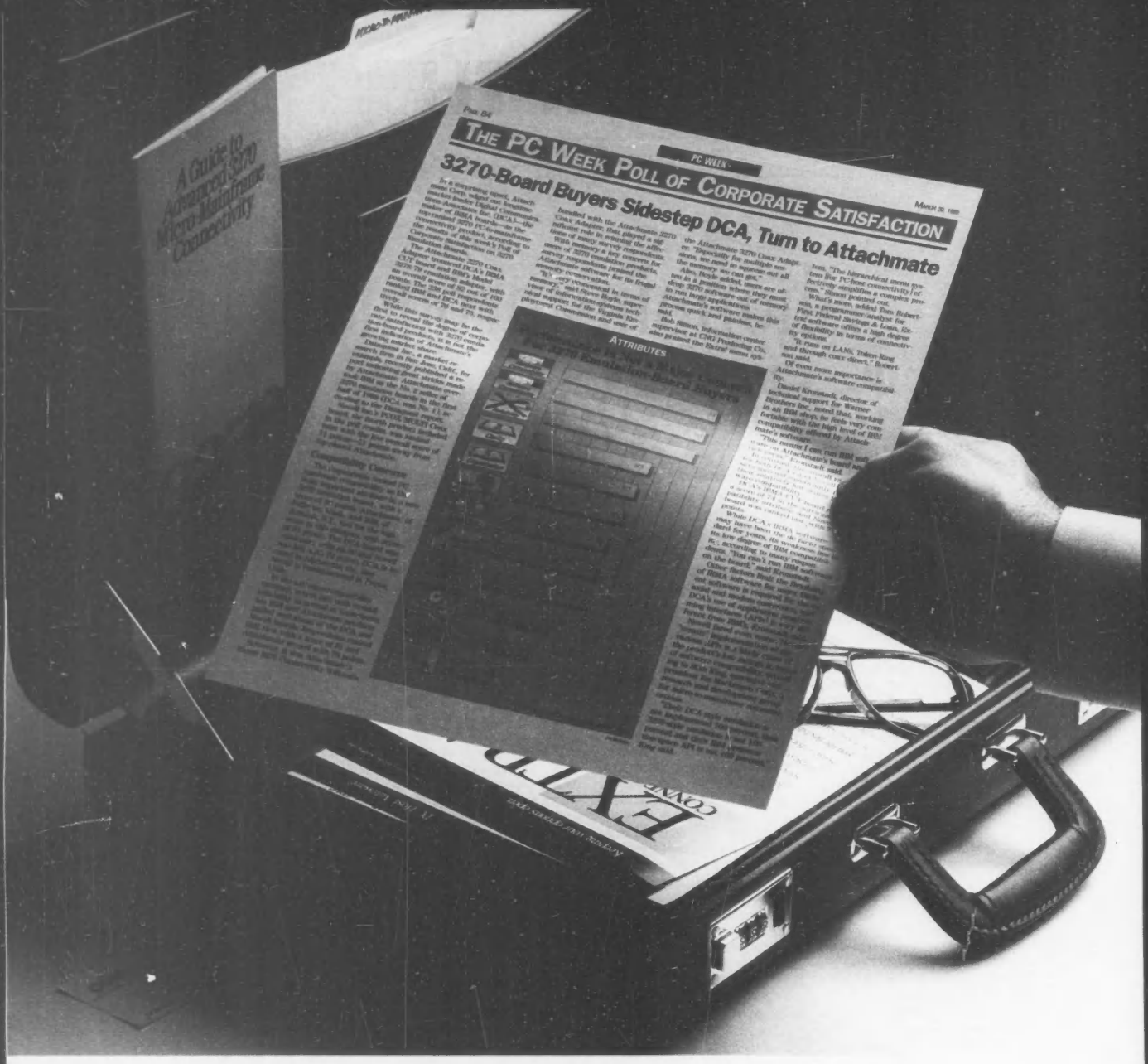
Clearly, the lack of common networking standards has made it quite complicated for departments within firms to share information conveniently. For example, it is difficult, and

Crocker is head of the new Heterogeneous Systems Technology Center at Digital Equipment Corp. in Palo Alto, Calif. In addition, he has been named by the joint DARPA/National Science Foundation Internet Activities Board as network management technical director for the TCP/IP Internet Engineering Task Force.



TERRY ALLEN

- **What you need to know but were afraid of**
- **The TCP/IP vs. OSI controversy**
- **Of translation gateways and standards**



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sometimes impossible, for information from the sales database to feed into the accounting or marketing systems. Documents written by engineers may need to be retyped into the machines used by the technical publications department.

There are two very different ways of scaling the wall of incompatibility that prevent systems from operating cooperatively. The first involves no modifications to either system because it interposes a translation device, or gateway, between them. Each thinks that it is talking to another one of itself, and the translation device does the mapping. The second approach is to get the vendors of the systems to adopt a common standard. As with most choices, there is merit to each approach.

Technical choices

The first approach to interoperability, which consists of application gateways that translate between "foreign" systems, usually is quite convenient for the user community. It requires users to learn little or nothing new to interoperate with resources on other systems. Further, it is the only approach that will work with older systems, which in most cases do not have vendor support for adding new capabilities. Most translation gateways are specific to an application: there is one for file-transfer or file-sharing services, another for terminal-oriented activities and so on.

Unfortunately, there are some situations in which the differences between systems are not simple and translations often lose information. An extreme version of this problem centers on programs themselves. Each operating system and machine has its own way of representing the binary information of an application. Generally, it is possible to convert the file containing the program from one format to another when you run a different operating system on the same hardware platform. However, it generally is not reasonable to convert the file to operate on completely different hardware.

In this case, a common element is used; for example, the C language source code is moved to the new machine and the program is recompiled. Currently, that is the only solution to this problem. Even interoperability standards have not helped.

The second approach to interoperability involves using such standards. Usually, the idiosyncrasies of different systems remain, but a veneer of shared functions and formats is added. In some cases, vendors publish the specifications of their own proprietary networking technology, such as IBM's Systems Network Architecture or Digital Equipment Corp.'s Decnet. Other vendors then can, and often do, implement some of it. These implementations end up looking like they are part of the proprietary technology.

However, because of the concern of unfair advantage, the marketplace often prefers technology that is developed independently. Therefore, openly accessible standards bodies have become important. Transmission Control Protocol/Internet Protocol (TCP/IP) is the earliest set of public specifications and covers a wide range of networking functions. It was developed under funding by the Defense Advanced Research Projects Agency and permits a set of common communications services and a strong base for the development of additional applications.

In the mid-1980s, the International Standards Organization (ISO) released a set of specifications for Open Systems Interconnect (OSI). The term "open systems" has come to refer to these sorts of public standards. There is an apparent competition between TCP/IP and OSI (see story page 94); what is most significant, however, is the increasing popularity that such common standards have. Even so, many in IS remain confused about the features and limitations they provide.

When public is private

From a technical standpoint, the engineering of vendor-published implementations requires the same effort as implementing one that is publicly developed. The fact that the technology is actually controlled by one other company can alter the amount of detail that is available. In fact, the published specifications can even deviate from the actual implementations of the originating company. This can occur when the original vendor publishes the specs quite a bit after it implements them internally and some details go undocumented in the public version.

Interoperability involves more than standards. Open systems such as TCP/IP or OSI are really a wide set of capabilities. As time passes, the set of available functions grows for each. Currently, terminal access, file transfer and electronic mail are the core user applications. Data sharing, as opposed to the transfer of whole files, is becoming increasingly popular, as is the operation of a distributed directory service. Further, network management has become a very active area, as IS encounters the difficulties of operating large, complex and heterogeneous networks.

Terminal access allows a remote user to get the same service as a directly connected device. The protocol determines what styles of devices are supported. At its simplest, the service may be for a dumb ASCII terminal; slightly more complex are the so-called "glass terminals" — the original display-only Teletype devices. Even more complex are the bit-mapped graphics devices that are supported by the X Window System protocol distributed by MIT.

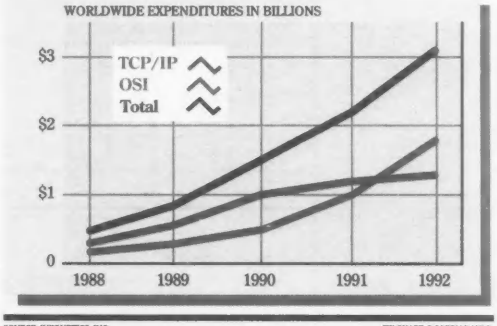
File-transfer protocols are oriented toward the exchange of entire files, whereas file-sharing protocols allow remote file systems to be "attached" to the user's local secondary storage. This requires intimate integration into the user's operating system so that all file-system service calls have the option of accessing the remote files.

E-mail allows the sending of messages to one or more recipients and may support automated "bulletin boards" for distributed conferencing. As E-mail systems grow, one of the major difficulties is determining and remembering the addresses of recipients. This has motivated the pursuit of directory services using hierarchical, distributed, redundant database technologies. These systems constitute the most complex, large-scale use of interoperable network technology today.

Beneath the layer of application services, there are more capabilities available, at least to programmers. At a minimum, there are raw transport services, usually one for sustained, "connection-oriented" sessions and another for quick, single-shot communications. Higher level programming support is becoming convenient through a "remote procedure call." In OSI, this is called Remote

How much users spend on standards

Based on user expenditures, OSI should pick up steam, outpacing TCP/IP by 1992



SOURCE: INFONETICS, INC. CW CHART: DOREEN DAHLE

What networked users are considering

Widespread use of multivendor protocols is growing but is still a couple of years away, according to the 53 multivendor networked sites of 100 sites surveyed

IQ How many of your organization's IS resources are currently employing a multivendor protocol such as TCP/IP, OSI or XNS? In 2 years? In 5 years?

NUMBER OF RESPONDENTS

Percent of IS resources	Currently using	In 2 years	In 5 years
Less than 10%	9	6	5
10% to 19%	7	7	3
20% to 49%	5	10	6
50% to 74%	5	7	11
75% to 99%	8	4	4
100%	2	9	12
None	13	5	2
Don't know	4	5	10

SOURCE: 1989 ADVANCED COMPUTING ENVIRONMENTS SURVEY CW CHART: DOREEN DAHLE

Try making connections at Interop '89

Information systems managers interested in gaining more information on interoperability issues may want to consider attending this year's Interop '89 conference and exhibition, presented by Advanced Computing Environments of Mountain View, Calif.

With a theme of "The Path to Open Systems: TCP/IP, OSI and the X Window System," the conference is scheduled for Oct. 2-6 at the San Jose Convention and Cultural Center in San Jose, Calif. This year's Interop is co-sponsored by *Computerworld*, its sister publications *Network World* and *Federal Computer Week* and the Corporation for Open Systems International.

In addition to a multivendor interoperability exhibition — "Show and Tel-net" — consisting of more than 100 vendors, there will be 17 one- and two-day in-depth technical tutorials, three plenary addresses and 35 regular conference sessions. Each of the program sessions falls into one of five parallel tracks: "The Basics of TCP/IP," "Advanced TCP/IP Topics," "Enterprise Internets," "OSI Today" and "Emerging Technologies."

Plenary speakers and topics include McDonnell Douglas Computer System Co.'s Doug Engelbart on "Computer Networks: The Nervous System Supporting Tomorrow's High-Capability Organizations," AT&T Bell Laboratories' Paul Bartoli on "Open Systems Interconnection: Status and Future Directions" and the Corporation for National Research Initiatives' Vinton G. Cerf on "The Future of the Internet Protocol Suite."

Further, there will be at least 10 evening "Birds of a Feather" sessions, designed to provide an opportunity for informal discussions of networking issues. "Birds of a Feather" session topics include "Doing New Things with TCP/IP," "TCP/IP Under OS/2," "Digital Equipment Computer Users Society TCP/IP Working Group," "Internetting in a Supercomputing Environment" and "White Pages for TCP/IP Internets," among others.

Finally, Interop '89 will offer "Solutions Showcase," which will feature special cooperative demonstrations of different manufacturers that have implemented common products or protocols. The scheduled demonstrations include Common Management Information Protocol over TCP network management, Simple Network Management Protocol network management, TCP/IP over Fiber Distributed Data Interface, OSI networking, Netbios over OSI and the X Window System.

For more information or to register, contact Advanced Computing Environments, Suite 100, 480 San Antonio Road, Mountain View, Calif., 94040 or call 415-941-3399, extension 734. •

Operations. It allows applications to exchange data as if they were cooperating subroutines.

Because IS is still learning about interoperability, it probably tends to put much more effort into deciding about communications purchases than it would like. But IS must be extremely conversant in the basics of the networking technology to make informed choices. This begins with a very careful understanding of the desired functions. Will the network be used primarily to allow remote, terminal-oriented access to time-sharing systems? Is the predominant use likely to be remote file sharing? How many users will be active at any one time? How active will they be? The complexity and size of the user community can place widely different demands on the technology.

In general, application gateways will work best for smaller communities of users that need only occasional access to remote resources. Heavier use will tend to show up the performance or functional weaknesses in the translation technology. This is not necessarily because of a limitation in the vendor's technical skills but rather in the basic approach of application translation.

For open systems based on common standards, the wide range of service choices also creates a complex and confusing situation for IS purchasing decisions. In the face of these complexities, IS sometimes makes excessively detailed specifications of product characteristics. IS may end up requiring strict conformance to the original specifications, thereby losing the benefit of a vendor's having kept its implementation up to date.

For example, the generic core set of network services provides for reliable transfer of raw data. One portion of the core is the transport service, which creates connections and is generally responsible for the reliability functions and for dealing with conditions of network congestion. For TCP/IP, TCP performs this function. The original protocol specifications detailed aspects of the implementation algorithms for TCP. However, in the last two years, there have been major advances in the development of better algorithms that IS managers may not have known about.

In reality, most vendors have technically adequate products. Some, of course, have better performance or require less memory, but these often are not critical to the actual end-user experience. Certainly, a file transfer that is 10% faster sounds better. On the other hand, an awkward user interface can eliminate any of the difference.

In the world of interoperability, the real question is the experience of the vendors in getting their products to work with other implementations. Technical specifications are not mathematically precise, and highly talented and experienced engineers can and do differ in their interpretation of the specifications. As a consequence, a careful implementation does not ensure interoperability.

In fact, the development phase is only the beginning of the process. Vendors then must cycle their products through conformance and/or interoperability tests. Conformance tests are formal, objective tests. The theory behind them is that any two implementations that pass the same conformance test will then be able to interoperate.

While such tests do in fact identify many common and many esoteric anomalies in implementations, their use does not seem to be sufficient to guarantee the general utility of an implementation. As a consequence, all product development must include a cycle of testing against the products of other vendors.

But even a product that has been extensively tested and used in complex user environments is still subject to interoperability problems. Although a product may have been used for months or years with five or 10 other vendors' products, the introduction of a new vendor's product can pose problems. Worse, the violation of the standard may not be by the new vendor. This means that IS needs an additional skill: the ability to diagnose and correct such problems.

When networking is vendor-specific, the expertise and responsibility for such troubleshooting resides solely with the vendor. With interoperable networks, however, an organization's network administrator must hold those skills and become expert at coordinating diagnostic activities among the vendors. This suggests that vendors that are quick to respond to problems and are expert in their diagnosis will quickly gain the favor of IS. It also means that there should be a significant IS need for network management tools that are easy to use. As is often the case with technology advancement, IS pressure on vendors for such offerings will be the catalyst to getting its own interoperability needs met. •

What users who aren't networked are considering

Of 100 sites surveyed, less than half of the 47 single-vendor or nonnetworked multivendor sites have plans to network

Q Does your site plan to be networking equipment manufactured by different vendors within the next 2 years?

NUMBER OF RESPONDENTS

	Total
Yes	18
No	29

SOURCE: 1989 ADVANCED COMPUTING ENVIRONMENTS SURVEY

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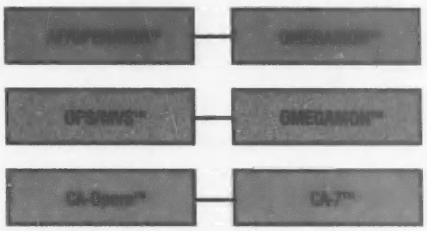
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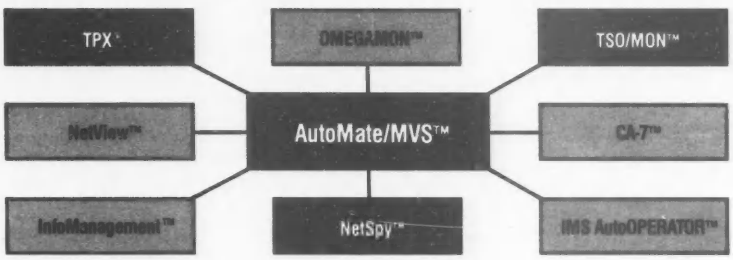
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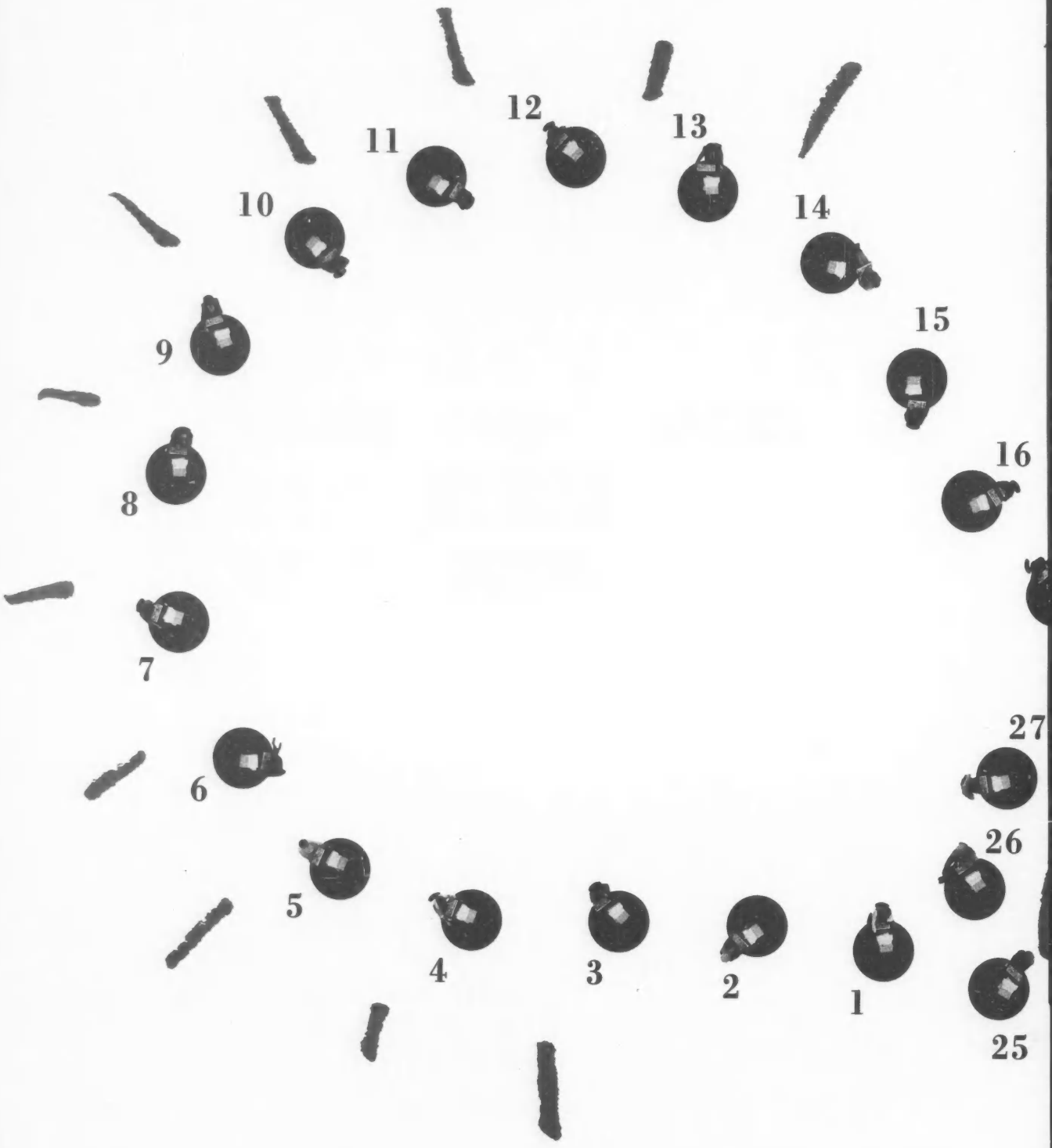
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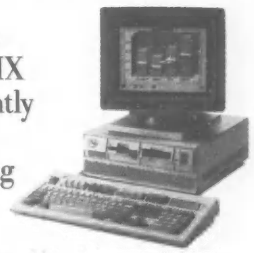

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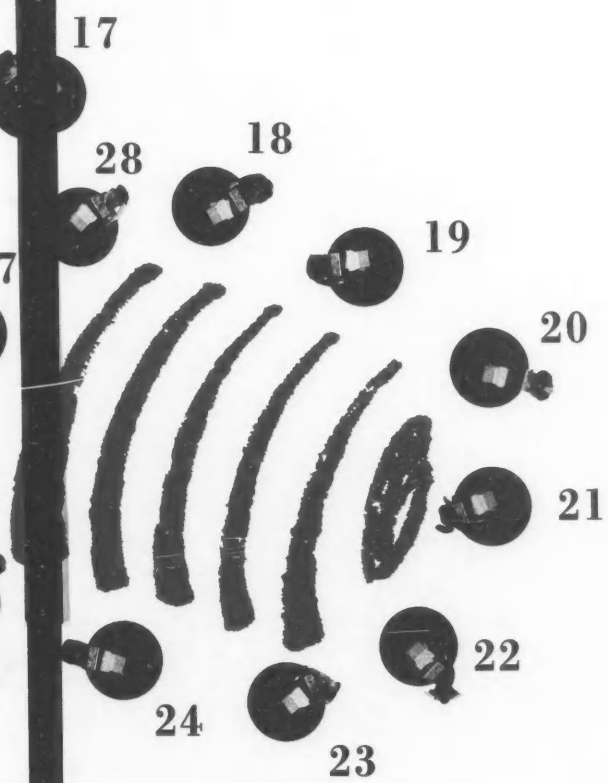
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IBM

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Battle of the Titans: TCP/IP vs. OSI

Some say that the nice thing about standards is that there are so many to choose from. In the case of open systems networking, there are two major contenders: TCP/IP and OSI. However, information systems managers may find that there need not be contention at all.

The U.S. Department of Defense's Transmission Control Protocol/Internet Protocol (TCP/IP) represents 17 years of development and use. Development work began in 1972, and 1976 was the first year of implementations. In 1983, it was put into heavy production use. TCP/IP is the product of the research and academic computer science world and is currently used in a wide range of academic, government and industrial settings.

In the other corner is the Open Systems Interconnect (OSI) stack of protocols, primarily credited to the International Standards Organization. Theoretical work on the OSI reference model began in 1976, with protocol specifications beginning later. Initial, completed protocol specifications began to appear in the early 1980s with some early products appearing in the mid-1980s.

Thus, the OSI specifications have just recently reached a sufficient level of breadth to warrant consideration for use in production networks, and a range of production-quality products is emerging only now.

Where's the beef?

The debate about these two sets of standards tends to take two forms. One looks at functional adequacy and performance limitations, and the other looks at overall stability and safety.

For simplicity's sake, it is considered best to divide the discussion between the "lower layers" and the "upper layers." The lower layers cover basic interprogram communications over a network or over a connected set of networks — internetworks. The upper layers provide the functionality that has application semantics.

In most implementations, the lower layers are placed into the operating system kernel and the upper layers run as application programs.

An exception would be an application such as a file-sharing protocol, which makes remote files part of the local file system. These services usually are implemented in the kernel.

OSI and TCP/IP are quite similar in the lower layers. But TCP/IP is starting to show some weakness in terms of window size and address space.

TCP/IP's window size limits the number of bytes of data that can be kept in the pipeline in fast, long channels, such as wideband satellite. Its address space limits the total number of networks and hosts that can be part of the same internetwork.

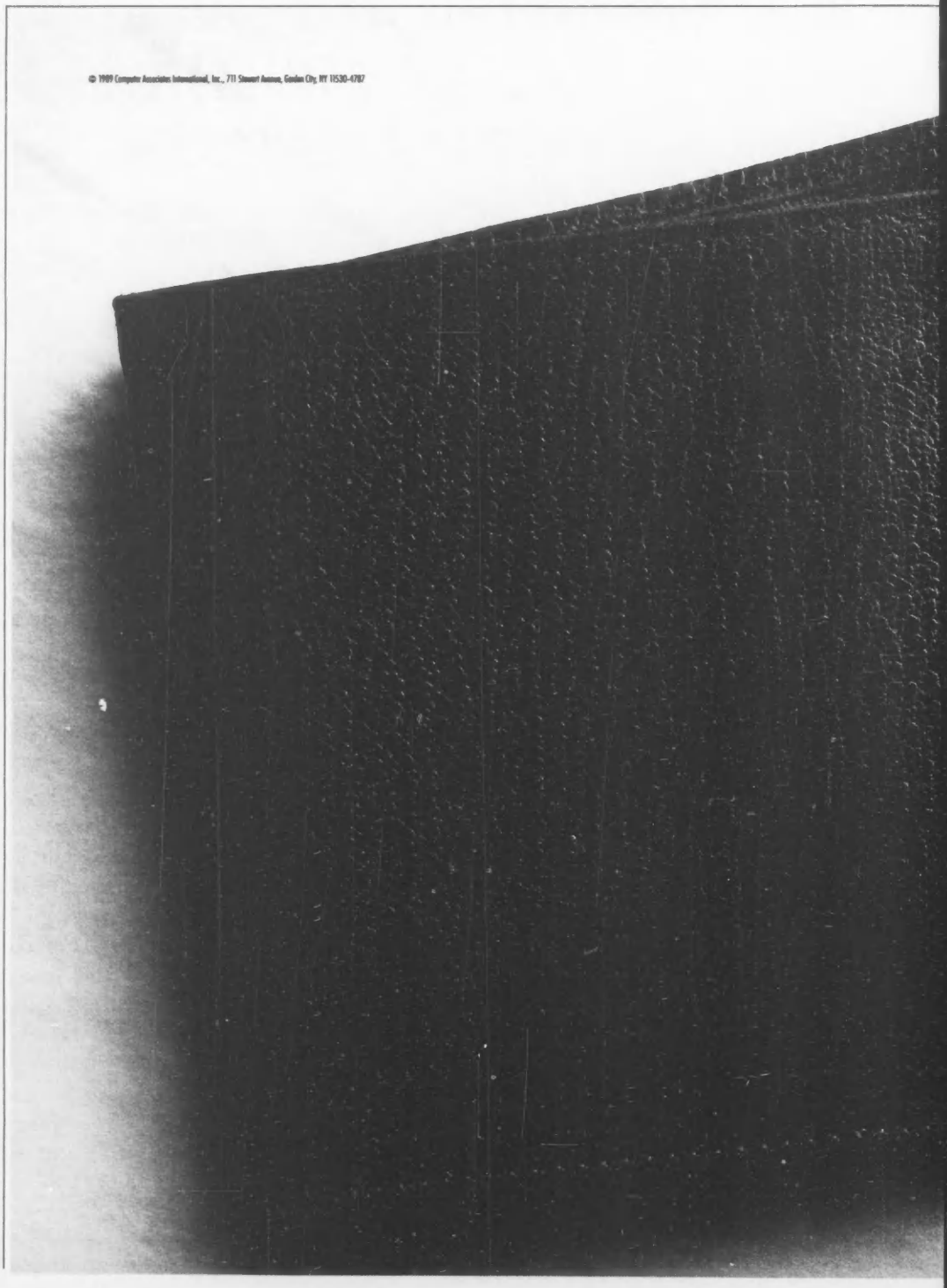
Proponents argue that both of these limitations can be fixed with minor enhancements to the specifications, and some initial efforts are already under way.

Moreover, the limitation to the total number of networks is not a problem for any current networks or internetworks.

The lower layers of OSI are primarily criticized for architectural complexity. Whereas TCP/IP has one connection-oriented protocol, namely TCP, the OSI stack has five, TP Class 0 through TP Class 4. And none of these protocols can talk to one another. To get the user of OSI's TP Class 0 to talk to a user of TP Class 4 requires a transport service bridge.

However, such a facility violates the spirit of OSI — translation is not supposed to be done in the transport layer — so there are currently no transport service bridge products fully deployed.

TCP/IP has the edge in safety and performance areas. It has



more than 13 years of implementation experience and more than six years of very large-scale field production experience behind it. OSI generally has only a few years of implementation experience and very little field experience.

Further, recent advances in TCP/IP itself permit some very high-performance connections, such as 8M bit/sec. on a 10M bit/sec. Ethernet setup. Some of these advances can be applied to OSI's TP protocols, but work in that area is quite new. Critics of the OSI lower layers contend that the design of data formats introduces significant inefficiencies.

OSI SPECIFICATIONS HAVE just recently reached a sufficient level of breadth to warrant consideration for use in production networks, and a range of production-quality products is emerging only now.

The choice for network administrators today is whether the current use of OSI lower layers carries operational risk. While there is little question that the industry and the user community are moving inevitably and quickly to OSI, there is considerable curiosity about the timing of OSI's use in large, operational networks.

Moving up in the world

In the upper layers, TCP/IP is criticized for inadequate architecture and too little functionality. The architectural limitation is best characterized by observing that TCP/IP has no layering of functions above transport. That is, each application must define all of its own subordinate services rather than have common services for managing multiple data streams, performing data transformations, defining transaction exchanges and the like. Whether the OSI specifications for these services are ideal or not, there is considerable benefit to their being factored out of the specific applications.

The competing argument is that TCP/IP predates the OSI reference model, so it is silly to criticize its lack of conformance to it. Further, its application protocols are intentionally relatively simple. This latter point is quite important. A typical implementation of TCP/IP's Simple Mail Transfer Protocol service takes about six programmer-months. A typical implementation of OSI's X.400 electronic mail service takes about six programmer-years.

This highlights a major point: TCP/IP application services do mostly simple things well. Conversely, the OSI applications, especially E-mail and directory services, attempt to provide much more ambitious services and promise extremely rich capabilities, such as the exchange of multimedia documents — complete with multifont text and graphics — as well as a worldwide "white pages" directory service.

The domain name service, which is TCP/IP's corresponding directory capability, is used almost exclusively to map the names of machines, or hosts, into their internetwork address. While this is quite useful for system administrators, it has limited benefit to end users.

OSI's directory service, on the other hand, will allow users to find out about many different network resources, including such things as the mail address of users.

The relative similarity of the lower layers, coupled with the significant difference in the upper layers, has suggested a possibility that some people are finding quite a shock: What about using the fancy, powerful OSI applications on top of basic TCP/IP networks? Adding new applications to a network is quite simple and involves no modification to the base network. Further, it may cause end users to *desire* a change to their network, rather than view such changes as irritating disruptions.

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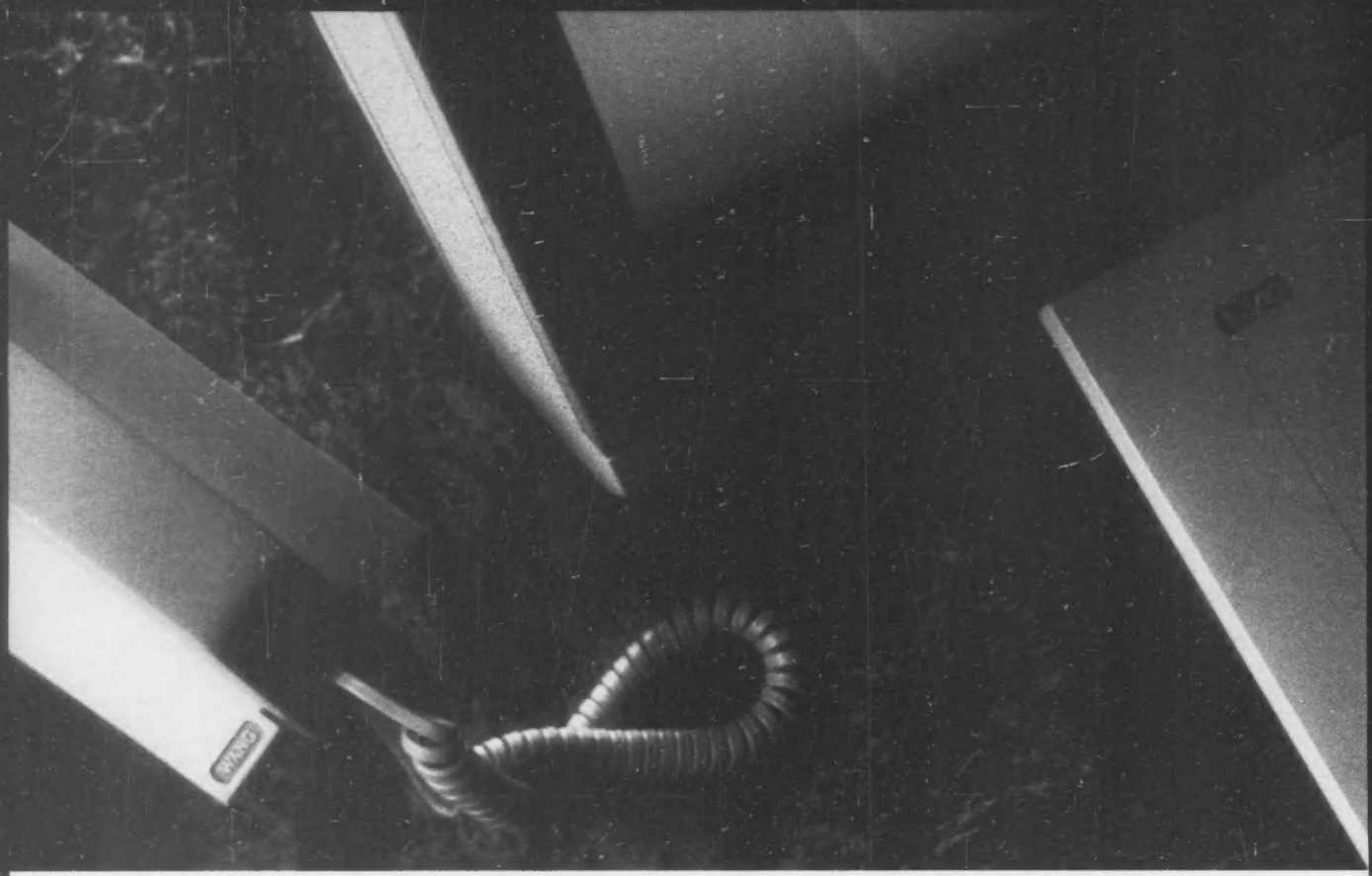
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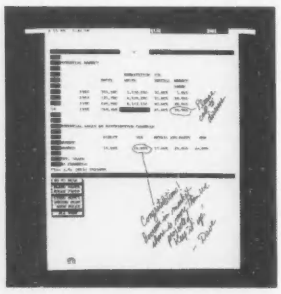
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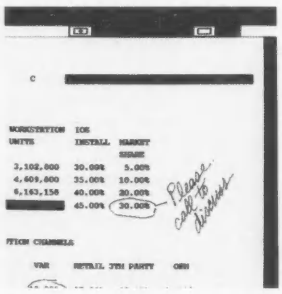
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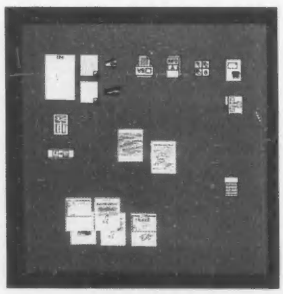
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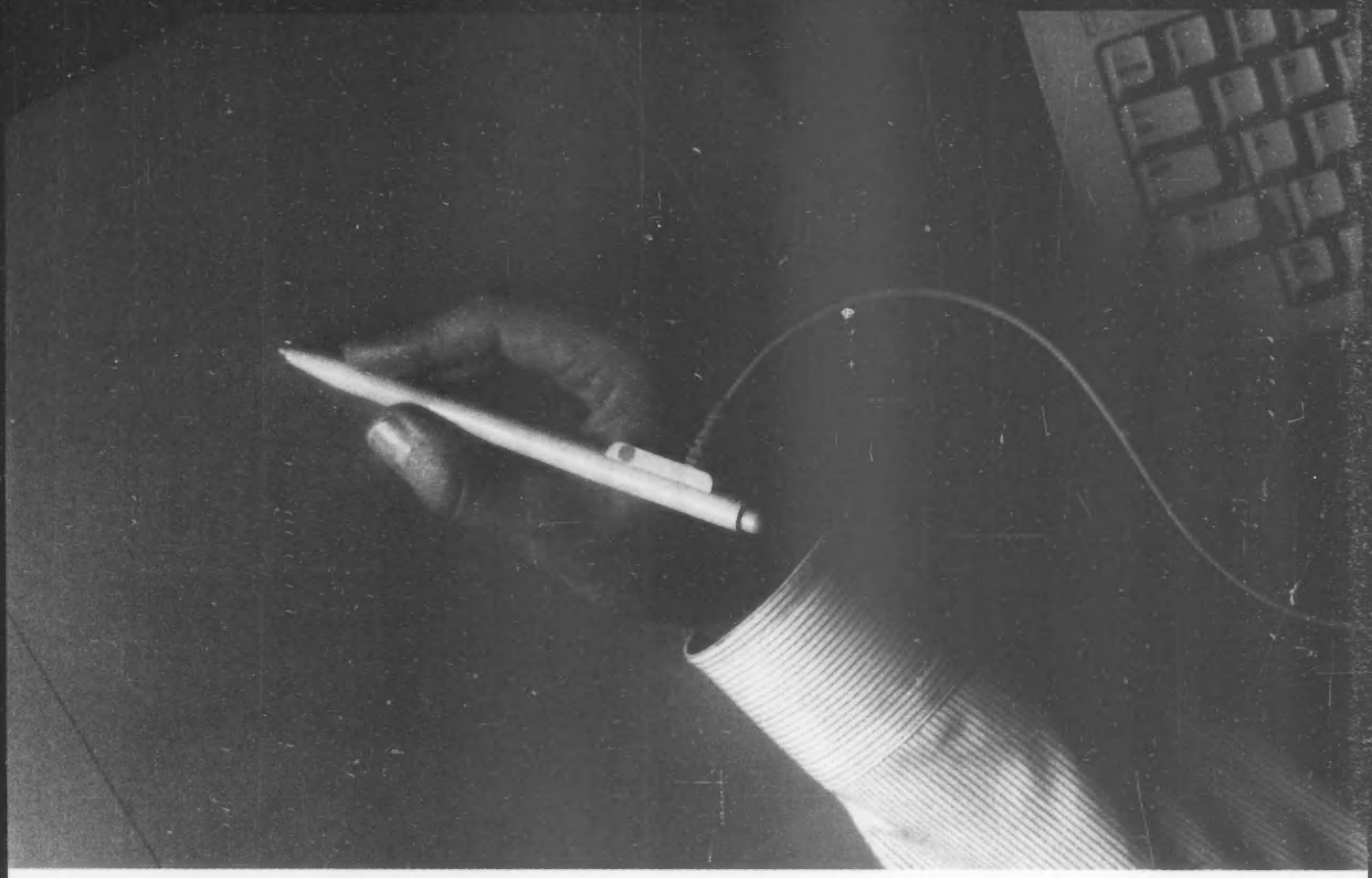


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Actual Wang computer screens shown here.



It's Freestyle from Wang.

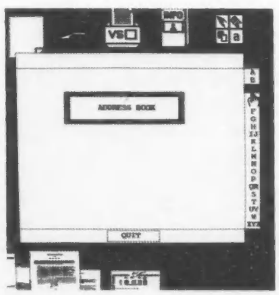
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INDUSTRY INSIGHT

Charles Varga

Tracking trouble signs



Wang, Prime, CDC, Informatics, McDonnell Douglas — all have been the victims of the ills that seem to be omens for the computer industry. This mixed bag includes financial troubles, growing pains and takeovers (friendly or otherwise). What are the signs of trouble? Are there any early warnings?

The following red flags come to mind:

- Frequent changes in top management.
- Roller-coaster earnings and revenue.
- Delays in the introduction of new products and service offerings, or abandonment of promised offerings, with a subsequent nosedive in maintenance and support services.
- Wizards of middle management exiting stage right, either singly or en masse, often followed by a host of what observers call "the good guys."
- Sale of inside stock by principals, directors and other fat cats.

And there's more. Once you

Continued on page 101

Inside

- Software escapes hard times on Rt. 128. Page 101.
- Peripheral players to bask in Ardent, Stellar radiance. Page 102.
- Adage, GBIC look into merger — again. Page 104.

Banyan delays public offering

BY PATRICIA KEEFE
CW STAFF

WESTBORO, Mass. — The aftermath of the networking industry's version of an earthquake — two straight disappointing quarters each from market leaders Novell, Inc. and 3Com Corp. — has finally slapped the East Coast. As the two giants splash about seeking solid footing, shock waves have rippled across Wall Street, significantly driving down the value of both vendors' stock and forcing Banyan Systems, Inc. to beach plans for an initial public offering.

"I'd love to go public right now, but the current market conditions are not what I had anticipated," Banyan President Dave Mahoney said.

He claimed that numerous networking companies "are all having various performance problems" and have soured the investment community on networking stocks.

"It's very confusing out there," Mahoney said, citing uncertainty among the buying public over OS/2 LAN Manager's role and Novell's positioning. He added that he is wary of having to address the problems of the entire networking industry to get Banyan's story "properly understood."

Financial analysts maintained that any networking firm with a good story — particularly one in a niche — can do and have done well. Examples of communications companies that have either successfully gone public or made second- or third-stage stock offerings in the last 12 months include Network General Corp., Synoptics Communications, Vitalink Communications Corp., Cabletron Corp. and Newbridge Corp.

Yet Banyan is most often compared with 3Com and Novell, both of which have stumbled recently. "After seeing 3Com [stock] go from $28 to about $11, that would scare me, and I don't think 3Com is *that* bad off," said Lee Doyle, an analyst with International Data Corp., a market researcher based in Framingham, Mass.

"There's not a lot of enthusiasm for establishing a position in

Continued on page 100

Banyan IPO stalls

Banyan fears offering will be shackled by problems dogging nearest competitors



SOURCE: U.S. GENERAL ACCOUNTING OFFICE
CW CHART: JOHN TIBBE

New Commodore chief readies for makeover

BY RICHARD PASTORE
CW STAFF

"Nobody trusts Commodore."

"We don't feel they are major competitors."

"It's a games machine; it's not a high-quality box."

With these harsh strokes, professional microcomputer users randomly contacted by *Computerworld* painted a dismal portrait of Commodore Business Machines, Inc. And it is this poor image that the company's new management must blot out in its pursuit of renewed growth in the education, government and commercial arenas.

President Harry Copperman, appointed in late April, seems capable of pulling it off, according to several analysts impressed with his credentials (see box below).

"He's a good man for the job," said Ronald Opel, an analyst at Fechtor, Detwiler & Co. in Boston. "He appears to have good market sense and a high level of technological sophistication."

Copperman is not the first to try to turn Commodore's North American operations around. After Commodore bottomed out in 1985, losing hundreds of millions of dollars because of soft demand for entertainment software, Max Toy was tapped to augment the U.S. dealer stable. Though the company returned to profitability on the strength of its European markets, the North American operation continued to lose money (see chart page 104). Toy, no longer with the company, was replaced by Copperman.

Copperman differentiates himself from his predecessors on the basis of more extensive experience in marketing proprietary systems — in his case, gained at Apple Computer, Inc. In addition, he said, he is making more personnel changes, including recent key appointments of veterans culled from Apple, Computer Sciences Corp. and Compaq Computer Corp.

The company will lead its recovery gambit with its strongest hand — the Amiga. This workstation line, with its multitasking capability, strong graphics and a relatively low price point, is highly regarded by users and analysts.

"The Amiga is the computer that even Commodore couldn't kill; it's fantastic," said Gordon Coppoc, chief of veterinary physiology and pharmacology at Purdue University. "It's a great machine, the best-kept secret in the industry," said Charles Frumberg, an analyst at Mabon, Nugent & Co. in New York.

With its Amigas in tow, Commodore is initiating an all-out attack on the education and federal markets, in which it now has virtually no presence.

The company's new Federal Systems Group will go after federal contracts by seeking alliances with systems integrators and a major General Services Administration vendor, said group chief Randall Griffin.

Continued on page 104

Copperman's credentials

Commodore Business Machines, Inc.

April 1989 to present
President and chief operating officer

Apple Computer, Inc.

Sept. 1987 to April 1989
Vice-president and general manager, eastern operations

IBM

1986 to 1987
National director of marketing, Academic Information Systems business unit

1983 to 1986
Regional manager and director of marketing, National Marketing Division

1970 to 1982
Various sales, marketing and management posts, Data Processing Division

1967 to 1970
System engineer



Harold D. Copperman

Unisys forms image unit

BLUE BELL, Pa. — Unisys Corp. last week targeted a newly formed corporate office in the image processing market, a niche often cited as one of tomorrow's most promising market segments.

Seasoned Unisys executive Fred Meier will head the new Corporate Office for Imaging Systems, wearing the title of vice-president, imaging systems and reporting to recently appointed Unisys President James Unruh. Meier started as a Burroughs Corp. sales representative in 1956 and most recently served as vice-president of business development for the Unisys Network Computing Group.

"The integration of digitized document images with traditional computer-based information management," said Unruh in a prepared statement, "is clearly an important emerging technological development, which experts predict will generate revenues in excess of $5 billion by 1992." He pointed to a forthcoming payment imaging offering as a move into that market.

Banyan

CONTINUED FROM PAGE 99

those stocks right now," added Mary McCaffery, an analyst with C. J. Lawrence. "So Mahoney is right to a degree. He certainly would have to position himself in that arena, and he'd have to have a pretty good story."

Over at 3Com, a double whammy threatens to produce a loss for its second fiscal 1990 quarter: Hardware sales were hit by rampant discounting and a lull in the product cycle, while software sales are somewhat tied to the so-far weak growth of OS/2. The company is also revamping its distribution strategy.

In Novell's case, there is an ongoing effort to cut costs internally while moving to absorb its biggest acquisition to date — Excelan, Inc. So far, about 150 people have been laid off following that merger, industry sources said. In addition, Novell is experiencing some turbulence in its distribution channels related to the merger. It also suffered a drop in revenue while users waited for Netware/386.

Beyond the problems dogging Novell and 3Com, Banyan may need to work out a few kinks of its own. Banyan is not in need of cash. It successfully completed an $8 million round of financing in April and claims to have a so-far unused line of bank credit and an annual revenue growth rate of 75%.

But Banyan tends to take a very methodical, plodding approach. While an admirable trait in financial and product planning and development areas, it has left Banyan with somewhat anemic distribution and a very low profile, both among users and OEMs. When Banyan has gone for the bold stroke, it has not always paid off.

Former President Richard Meise, now top dog at Alloy Computer Products, Inc., joined Banyan in May 1987 and left two years later. Meise was hired in part for his distribution and marketing expertise, and he left to run his own company.

Banyan was burned by a much heralded strategic alliance with Wang Laboratories, Inc.'s since-dissolved autonomous microcomputer product division. Meanwhile, Novell and Microsoft have successfully lined up developers behind their respective platforms.

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2. Free accommodations and conference admission. Second Prize winner will receive three nights accommodations at the Grand Hyatt, plus one in-depth tutorial and free admission to the full conference and exposition. Approximate total value: $1,375.

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For a copy of the complete contest rules, or a list of winners, send a self-addressed stamped envelope to Communication Networks '90, P.O. Box 9171, Framingham, MA 01701.

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IN BRIEF

Trading places

Field sales and support functions at **Hewlett-Packard Co.** drew a step closer early this month when two senior executives swapped jobs in a company effort to promote closer integration between certain key areas. Senior Vice-President James A. Arthur left his post as director of U.S. field operations to become general manager of worldwide customer support operations. Manning Arthur's prior post is Vice-President Michael C. Leavell, former head of worldwide customer support.

Priceless

Regional telecommunications player **Metromedia Long Distance, Inc.** steps up to become one of the five largest U.S. long-distance carriers with its parent corporation's acquisition of **ITT Communications Services, Inc.** and **ITT Chernow Communications, Inc.** The purchase price was not disclosed.

Guilty

The former owner of **Compumart**, a Venice, Fla.-based personal computer mail-order firm, pleaded guilty to mail fraud earlier this month. Robert G. Norton was charged with mail and wire fraud for deliberately failing to ship PCs ordered from his now-defunct company [CW, Aug. 7]. He faces a $200,000 fine and/or five years in prison.

Taiwan on

The first **superminicomputer** designed and manufactured in **Taiwan** had its coming-out party at the World Computer Congress in San Francisco earlier this month. The reduced instruction set computing-based MR-10 was co-developed by the Industrial Technology Research Institute, a government-sponsored consortium and will be shopped around to American manufacturers. The computer business is one area where dark-horse Taiwan is planning a big push. "We're building up fast," a spokesman for the consortium said.

Spin potential

Digital Communications Associates, Inc. is looking into the possibility of spinning off its wide-area networking (WAN) operations to current shareholders. According to the Alpharetta, Ga.-based company, its WAN side and its PC communications side are finding synergy hard to come by in the voice and data communications market and might benefit from an amicable separation.

Varga

CONTINUED FROM PAGE 99

see the foregoing, the following are sure to follow:

- Stock prices begin to waver.
- Customers grumble, and the rumor mill begins to grind.
- Assets, divisions and subsidiaries not directly related to the core business are sold off to raise cash.
- Strangers in pinstripe suits and wing-tip shoes start to appear — folks with haircuts just this side of conservative and just a shave short of greed: investment bankers, management consultants, brokers or intermediaries.

What has taken place is that the "high-quality profits" of a decade ago continue to be fleeting dreams from which company management wakes up in a cold sweat. There is no free lunch. Parent corporations will expend almost unlimited funds on their children and their ventures, but at a certain point they will stop paying all the bills.

Warnings first sounded in the hardware and communications sectors are now being echoed in software and services. India, the Philippines, Jamaica, South Korea and Taiwan are becoming centers for the offshore production of software at payroll rates about one-quarter the annual scale for programmers and systems analysts in the U.S.

A glut of retail software, purchased without long-term service or maintenance agreements, now sits on corporate desks. Large software and services companies that started life as nimble entrepreneurial firms have fallen into the well dug by the imposition of a corporate management hierarchy.

Cutbacks by industry leaders, including Xerox's layoff of 4,500 to 5,000 employees and last week's announcement of Ashton-Tate's layoff of 15% of its 1,700-worker task force, appear to be a sign of the times for an industry in distress.

Many U.S. companies, including IBM and Motorola, instead of digging in and bracing themselves with U.S.-made technology, are turning to the East and embracing Japan. They think that joint ventures with Japan will ward off the sword. This strategy is too little, too late and probably can't succeed.

In the final analysis, it will be employees and information systems managers who may have the only win-win strategy identifiable in the industry today.

For IS managers, there should be fair pickings for the good guys who see fit to bail out and join the user environment.

For the employees, usually without vested interest in the companies in which they work, the course is clear: Watch for the warning signs, discreetly send your resume to key customers and plan to exit, in an orderly fashion, stage right.

Varga, a 20-year computer industry veteran based in Frenchtown, N.J., is publisher of "The Cerberus Report," a study of industry mergers and acquisitions.

Massachusetts rebounding

BY AMY CORTESE
CW STAFF

BOSTON — Michael Dukakis. The fall of basketball's Celtics. Rt. 128. Massachusetts has had its share of hard luck this year. And as the troubled minicomputer manufacturers along Massachusetts' Rt. 128 — Wang Laboratories, Inc. Data General Corp., Prime Computer, Inc. and Digital Equipment Corp. — are beaten up daily in the press, one might conclude, and some have concluded, that high-tech in the Bay State is washed up.

On the contrary, says the Massachusetts Computer Software Council. According to a recent survey, software may be the bright spot in the state's high-tech economy.

The state's software industry is poised for growth, concludes a survey conducted by Price Waterhouse for the Massachusetts Software Council. The 220 chief executive officers who responded to the survey that was sent to 798 area software companies were upbeat in their expectations for the future. Software sector employment is expected to grow 17% in 1989, accompanied by a 24% increase in payroll — healthy rates for any industry. And although the firms spanned the spectrum from start-ups to established vendors, with revenues ranging from less than $250,000 to more than $50 million, not one expected its revenue to decline over the next year.

The number of firms entering into development partnerships is expected to mushroom by 64% by the end of this year. Reflecting a broad industry trend toward cooperative relationships, more than a third of the surveyed firms responded that they had entered into software development partnerships in 1988, and 55% said they would do so in 1989.

Similarly, a little more than half of the firms indicated that they have established marketing alliances, and 70% said they planned to in 1989.

Growth will be fueled by new products, as respondents across the board anticipate introducing an average of two new products in 1989. To aid in development, Massachusetts firms are turning to the use of computer-aided software engineering tools, expert systems and object-oriented programming techniques, the survey revealed.

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(subject to revision)

- MIS salary and job satisfaction survey
- Where are the best jobs?/What positions are hot?
- Experiences of recent MIS graduates in their first jobs and what helped them in school
- The MIS career ladder
- Profiles of acclaimed top level MIS executives
- The strategic advantage of computers and how they play a key role in running a company

Fringe players stand to gain from Stellar/Ardent merger

BY JAMES DALY
CW STAFF

When the smoke finally clears on the merger of the key vendors in the graphics supercomputer market — Stellar Computer, Inc. and Ardent Computer Corp. — the big winner may not be the companies themselves but peripheral players that could gain handsomely from the financial windfall the union is likely to generate.

While management teams at the budding Stardent Computer, Inc. deal with the prolonged migraine of integrating overlapping product lines, two firms on opposite sides of the Pacific will likely be able to sit back and smile all the way to the bank.

Kubota Ltd., a Japanese agricultural equipment maker, may have scored the biggest coup of the deal. Kubota has invested $94 million in Ardent and owns a 44% share in the 4-year-old manufacturer. As part of the merger agreement, Kubota gets a 22% share in the new company, giving it the largest stake in the only significant graphics supercomputer firm in the world, plus exclusive Far East distribution rights to Stardent's products.

> "This is extremely good news for Mips; it's an instant and important sale with no legwork involved."
>
> SANDY GANT
> INFOCORP

The agreement also gives the deep-pocketed financiers at Kubota the room to increase their equity position. If the Japanese company ends up as majority owner, it could hamper Stardent's chances in bidding for the often lucrative U.S. government contracts.

While the market has taken off more slowly than many industry observers thought it would — Dataquest, Inc. estimates the entire niche at only $54 million for 1988 — some analysts still contend that the high-performance machines could eventually catch on in a big way and revolutionize the engineering and design process. Stardent would then be in a position to profit enormously, and Kubota would be along for the ride.

Meanwhile, the biggest and most immediate challenge for Stardent will be merging the Stellar and Ardent product lines and management. While the management transition is slated for completion within 90 days, a unified product line will not develop until the first half of 1991.

When it does, however, Mips Computer, Inc. will begin cashing in. At the merger announcement, Stellar's top executive John William Poduska and Ardent's counterpart Allen H. Michels noted that the new product line will probably use a Mips microprocessor similar to the one Ardent now uses.

This gives a significant endorsement to Sunnyvale, Calif.-based Mips, which is hip-deep in the struggle to establish a chip standard in the reduced instruction set computing (RISC) game. Although several vendors are trying to position themselves as offering the de facto standard, the title is still up for grabs.

Sun Microsystems, Inc. and Hewlett-Packard Co. both build high-end workstations using homegrown RISC chips and are aggressively licensing their designs to others. The largest feather in Mips' cap so far is Digital Equipment Corp., which uses the chip in some high-end workstations.

"This is extremely good news for Mips; it's an instant and important sale with no legwork involved," said Sandy Gant, an analyst at Santa Clara, Calif.-based Infocorp.

On the Stardent homefront, however, the challenges will be substantial. While the combined entity will have an increased market share, Stardent could get mired in personnel, facility and product family details that could pinch short-term growth. Paduska noted that an important goal during the transition will involve getting an entry-level machine priced at around $20,000. Analysts consider such a move key to increasing Stardent's chance of success.

In the meantime, competitors have begun to play up the uncertainty caused by the merger, hoping to leverage user concern and confusion to steal away sales. "Designing low-cost high-performance systems isn't something you just do overnight," said Forrest Baskett, director of research and development at Mountain View, Calif.-based Silicon Graphics, Inc. "This will be their first try, and I think they're going to have a tough time convincing potential customers to be actual customers."

Analysts also said Stardent will need to beef up the Stellar and Ardent software base. "Customers are increasingly looking for solutions products and not just high-performance workstations," Gant said.



EXECUTIVE CORNER

George Luntz, chief operating officer at Glendale, Calif.-based business applications maker **MCBA, Inc.** added "president" to his title earlier this month, replacing **Stina Hans**, co-founder of the 15-year-old software company.

"Being able to put the day-to-day running of the company into the hands of the right person — someone with a strong international background and [extensive] experience with the MCBA reseller channel — will allow me to concentrate on the long-term strategy aspect of the business," Hans said. Hans will retain the positions of chief executive officer and chairman of the board.



Luntz

Peter J. Boni is the new president and COO at Fort Lee, N.J.-based systems software and professional services vendor **On-Line Software International**. Boni, who has spent the past few years as an industry consultant, replaces **Jack Berdy**, who gave up the post to attend medical school but is remaining with On-Line Software as chairman and CEO.

Cyril Yansouni has been named president of Unisys Corp.'s Network Computing Group (NCG), reporting to Unisys Chairman and Chief Executive Officer W. Michael Blumenthal. He will also join the Unisys Internal Management Board. In his new position, Yansouni will be a senior vice-president Yansouni succeeds Paul Ely, executive vice-president of Unisys, who left the company and the board of directors for health reasons in mid-July.

Legato Systems, Inc. announced that **Louis C. Cole** has been named the company's first president and CEO. Cole comes to the Palo Alto, Calif.-based company with 25 years of experience in the industry and a successful track record in building and managing networking companies. He will oversee all development, marketing and sales operations at Legato, which was founded in September 1988 by a team of Sun Microsystems, Inc. software engineers. The company designs and markets products that enhance and simplify network computing.

Syllogy Corp. recently announced the resignation of **Martin Goetz** as CEO. This departure comes on the heels of the recent sale of Syllogy's CICSort IBM systems software product to Computer Associates, Inc., which, according to Goetz, shifted Syllogy's emphasis from software to consulting.

A. Maria Smith, developer of the UCC-1 tape management system for large IBM data centers, is the new president and CEO of **Sterling Software, Inc.'s** Systems Software Marketing Division. Systems Software Marketing, located in Rancho Cordova, Calif., is a major independent supplier of data storage management software for IBM mainframes.

Hisashi Kaneko, currently senior vice-president and director of **NEC Corp.** in Tokyo, has been appointed president and CEO of **NEC America, Inc.** He replaces **Tadishi Suzuki**, now executive vice-president of **NEC Corp.**, and will head up its international operations group.

David J. Barber has joined Salem, Mass.-based Cobol reverse-engineering and analysis tool maker **Language Technology, Inc.** According to John B. Landry, executive vice-president of development at Cullinet Software, Inc. and a Language Technology board member, "Dave has an impressive track record in taking start-up companies to the next level, in terms of sales and market strength."

Prior to joining Language Technology, Barber served as president and CEO of **Spectrum Interactive Corp.**, which he joined in 1982 when the company was a young start-up, growing to $25 million in sales by 1988.

Dynatech Computer Systems named Richard Moore to the post of president and CEO. Dynatech is focused on the integration of open-platform, Unix-based supermicrocomputers for niche markets. Prior to joining Dynatech in 1988, Moore was vice-president of engineering at **Zilog, Inc.**, where he headed the development of both the Unix-based supermicrocomputers and the semiconductor product lines.

Networking systems integrator Connolly Data Systems, Inc. announced the appointment of **William J. Cossart** as president. Cossart leaves the position of president of Telesis Controls Corp. in Ohio, which he has directed for the last three years. Current Connolly Data Systems President and company founder Patrick H. Connolly will continue as chairman and CEO.

Charles G. (Garry) Betty, former senior vice-president of sales, marketing and international operations at Norcross, Ga.-based Hayes Microcomputer Products, Inc., was named president and chief operating officer last week of Alpharetta, Ga.-based **Digital Communications Associates, Inc.**

Scorecard (Part 2)



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Commodore

CONTINUED FROM PAGE 97

The Amiga's networking capabilities are not yet up to federal standards, Griffin acknowledged. However, "we already have TCP/IP in place and are developing support for the government's GOSIP protocol," he said. "We also support DOS, and our AT&T Unix appears to meet Air Force requirements."

Commodore is pushing for big gains in the education arena. The timing may be right, because Apple is becoming vulnerable in this market, according to Opel. "Apple has old products out there, and the schools are getting set to replace them," he said.

But Commodore must tone up its third-party development to compete effectively in these markets, Copperman conceded. While there are some 1,700 Amiga packages, "they are not written by industrial-strength players," he said. "We'd like to have an Ashton-Tate or a Microsoft writing for us."

Consequently, Copperman has overhauled the firm's developer support group and charged it with selling the platform to major developers. To buff up its tarnished image among users over the long term, the firm is shifting its product emphasis from quantity to quality and will focus support efforts on postsales service, Copperman said. It is also aggressively pitching the machine to more upscale dealers.

In the near term, Commodore is launching a print and television advertising campaign this fall. Its estimated budget of $10 million to $15 million is a significant commitment compared with the previous year's $1 million ad budget, according to analysts.

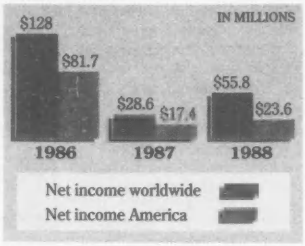
"They're finally going to spend the resources required," Frumberg said. "It's the last shot for them. I think it's a very good bet."

Though he has no hard numbers as yet, Copperman said that his goal is slow, steady growth. "I'm not here to make a big splash; I know there's a lot of competition out there," he said.

"It won't happen overnight," Opel agreed. "They are facing difficult comparisons with last year's exceptionally good Christmas quarter."

Commodore's recovery not made in America

Commodore's worldwide operations have returned to profitability after mid-decade disaster, but North American operation continues to falter



CW CHART: DOREEN DAHLE

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GBIC, Adage assent to merger plan

BY NELL MARGOLIS
CW STAFF

BILLERICA, Mass. — Merger plans are on again between computer graphics terminal maker Adage, Inc. and off-again, on-again partner-in-combination General Business Investment Corp. (GBIC).

Under a merger agreement inked last week, GBIC, a West Chester, Pa.-based manufacturing, real estate and financial services provider, will become a 57.5% owner of the combined companies' voting securities, with an option to expand to as much as 75% ownership, depending on the price level of Adage common stock.

The latter provision, said a GBIC spokeswoman, resolves the debate that had GBIC skittish about tying the knot with Adage. Pending shareholder and standard regulatory approval, the deal is expected to close by the end of this year. When it does, GBIC will enter the public market for the first time.

Throughout the wavering GBIC negotiations, as well as during earlier merger talks with minisupercomputer maker Multiflow, Inc., Adage made no secret of its urge to merge. The right strategic partner, said an Adage spokesman, would strengthen the company, "and we're going to keep on looking until we find one."

NICKELS & DIMES

Esprit Systems, Inc. reported revenue of $6.1 million, a 7% increase over revenue for the comparable period last year. Esprit's fourth-quarter 1989 net loss of $1.7 million is 35% higher than the $1.3 million net loss reported for the same period last year.

System Software Associates, Inc. reported net income of $2.9 million for the third quarter ended July 31, 1989, up 90% from net income logged for the third quarter of the previous year. Revenue for the quarter increased to $24.3 million, as compared with $14.8 million in the comparable quarter last year.

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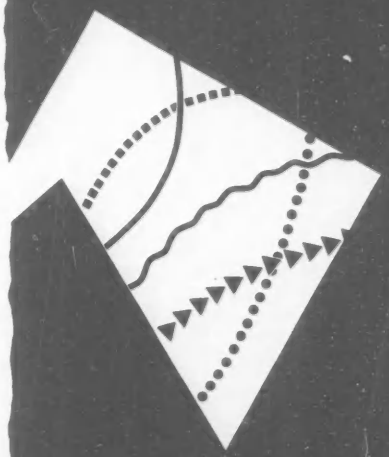
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COMPUTER CAREERS

The people side of systems

Not many human resources IS experts are technicians, but they can be

BY ALAN RADDING
SPECIAL TO CW

Many an information systems professional has weathered a job interview with someone from the human resources department who did not understand IS work. They might be happy to know that some companies are interested in developing in-house recruiters with a better grasp of the field.

Top IS managers have been wondering whether they are missing chances to attract key prospects because intermediaries from human resources have not been sensitive to the needs, interests, motivations and culture of IS groups, experts say.

Most corporate human resources professionals who specialize in IS have a nontechnical background. Of about 40 such managers who will gather at an upcoming symposium, perhaps four have worked as IS professionals, says Roger Sobkowiak, managing partner of Software People Concepts, Inc., a New Haven, Conn., consulting firm.

One drawback to a move from a traditional IS position into human resources is the likelihood of a cut in pay. Programmers and analysts make more money than in-house recruiters, says Mary Gablaski, second vice-president for employment, education and development at Paul Revere Life Insurance Co. in Worcester, Mass. However, the salary gap can disappear by the time an individual advances to the management level.

There are exceptions. Joy Dill, an IS recruiting manager at Procter & Gamble Co., did not suffer a cut in pay when she moved to human resources after six years as a systems analyst. Dill resented the long hours and stress she faced in IS and wanted to spend more time with her family. Human resources better suits her needs and temperament, she says.

"I am a transplanted technical person, but from now on my career will be in human resources," she says.

Sobkowiak says IS human resources work often presents unique demands, particularly regarding career development, a situation that is fueling demand for human resource professionals with a better understanding of IS.

However, others warn against singling out IS for too much special treatment. "It is more the same as other departments than different," says Chester Delaney, vice-president for systems human resources at Chase Manhattan Bank in New York.

One key difference, however, involves motivation, Delaney says: "The difference is mainly in the type of tools. IS people are motivated by the right kind of tools — technology."



NICOLAE ASCIU

Delaney says the issue in hiring and developing IS professionals is not technical skills but credibility — whether a recruiter can establish rapport with IS personnel.

Gablaski, who manages an IS specialist without an IS background, says the primary requirement for a career in human resources is communication skills.

"Recruiters like to be involved with people and to communicate," she says. "IS has its own jargon which has to be learned, but the recruitment techniques are essentially the same as for any other department."

Jim Bucci, vice-president of human resources at International Catering Corp. in Waltham, Mass., says IS should get special treatment from his department but that he does not need IS professionals to provide it.

"You need to be used to dealing with IS people. You need an appreciation of what they do and how they work," Bucci says.

These arguments are not meant to discourage IS professionals from pursuing a specialty in human resources, experts say. For example, a project manager with strong communications skills might make a good candidate for a human resources career. Dill finds her technical background an advantage, especially when she is recruiting more experienced IS workers. She says she does more "front-line" work, such as attending career fairs, compared with two colleagues who do not have a technical background.

Delaney, who started as a systems analyst and moved into technical education before human resources, says training is often a good stepping-stone to the human resources department because those groups increasingly direct training, education and career development as well as recruitment.

Along with becoming an in-house recruiter, Gablaski says IS professionals interested in the field should consider working for recruiting firms that specialize in IS.

In-house human resources organizations must address additional concerns such as benefits and affirmative action, and the recruiting firms probably will pay more, she says.

Radding is a Newton, Mass.-based author specializing in business and technology.

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Florida International University is a comprehensive, urban, public institution which is part of the State University System (SUS) of Florida. Located in Miami, the University serves a culturally diverse population of over 17,500 students.

Minimum requirements: A Master's degree in an appropriate area, and 4 years of directly related professional experience; or a bachelor's degree in an appropriate area, and at least 6 years of directly related professional experience. A background in the educational computing environment, preferably in both the academic and administrative arenas, would be a plus. The UCS Director must possess good management skills and be able to work effectively with students, faculty, staff, and other State Agency personnel at all levels. Salary and benefits are competitive.

Applications should include a resume and the names of three references. Nominations are also encouraged. Applications or nominations must be postmarked no later than September 28, 1989, and should be sent to:

Chair, Director of University Computing Search Committee
Florida International University
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Applicants required to have bachelors degree in Math, Computers or Engineering with at least four years ACP/TPF programming and software analysis. Education and experience will be acceptable if applicant possesses a combination of education, professional development training, and experience found to be equivalent to a bachelors degree in Computers plus two years experience with ACP/TPF programming and software analysis.
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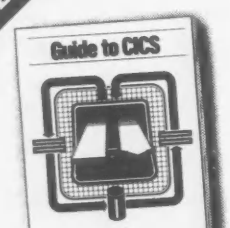
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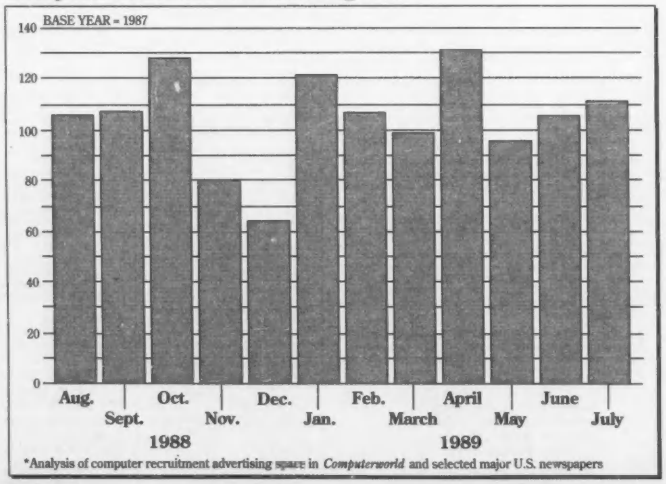
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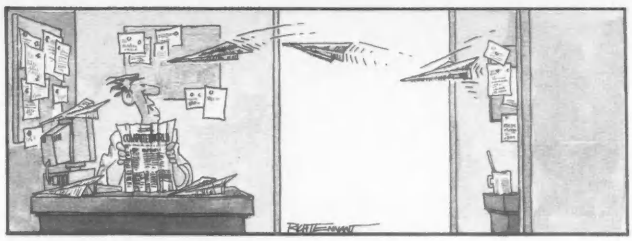
Computer recruitment advertising index*



*Analysis of computer recruitment advertising space in *Computerworld* and selected major U.S. newspapers

SOURCE: CW PUBLISHING, INC.'S RECRUITMENT MARKET RESEARCH DATABASE

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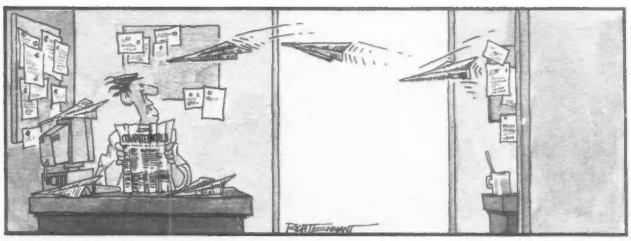
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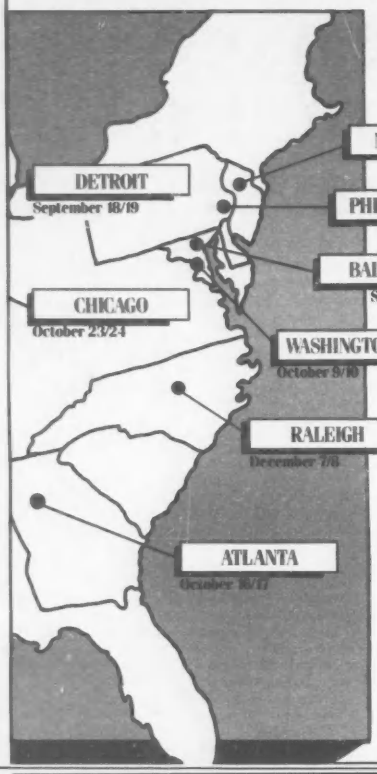
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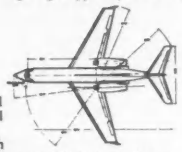
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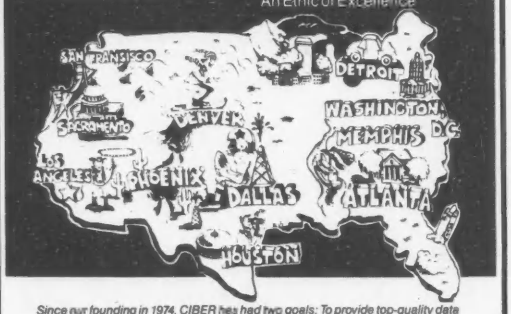
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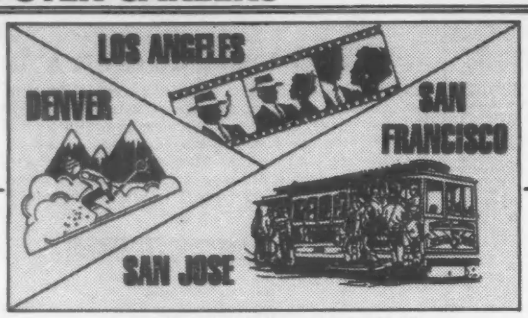
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MARKETPLACE

A quest to earn PC users' trust

Mail-order PC dealers hope better service wins users' stamp of approval

BY ALICE BREDIN
SPECIAL TO CW

There are a few generally understood principles in life. One is that there is no such thing as a free lunch. Another is that personal computers from mail-order houses do not come with service.

Mail-order vendors, however, are trying to change that view. Some end users say that in many cases, good service is no harder to get through the mail than through a local dealer.

Other users contend that service from mail-order vendors is more limited than a local dealer's service but that they do not need the hand-holding that dealers offer. They want to take advantage of the cost savings characteristic of mail-order buying.

"We've found that the service we get through the mail is as good as what we get from a local dealer," says Joey Robichaux, a systems analyst at Georgia Gulf Corp. in Baton Rouge, La.

Robichaux says the company used to buy approximately 100 PCs and corresponding peripherals per year from Tandy Corp.'s Radio Shack Division and had them serviced by the company's storefront operations.

"A local service center is only as good as the people who work there. Sometimes it was good, sometimes it wasn't," Robichaux says. "Some of our offices would have to mail systems to us because they couldn't find a good dealer for service in their area."

Costly configurations

On the other hand, some computer dealers still claim they spend a lot of time and money correcting configuration problems with mail-order PCs. "The problem is, people think they have the technological know-how to configure the systems themselves. Then they realize they don't," says Rick Weir, a regional marketing manager for AC3 Computer Centers in Ann Arbor, Mich.

Dealers also say that many users will come to their local stores and service centers simply because it is more convenient than mailing goods back to a mail-order vendor.

A July survey found that of 9,000 end-user sites with 500 or more employees, only 1% bought PCs through the mail, according to Johanna Von Kotze, research manager at Computer Intelligence in La Jolla, Calif. "If you're in a corporate environment, you have a purchasing staff that goes out and negotiates the best deal with software and service," she says.

However, mail-order houses are beefing up their service offerings and informing users of them. Earlier this year, Austin, Texas-based Dell Computer Corp. began advertising that its guarantee and a 90-day exchange policy that promises a new machine or part within 48 hours. Most recently, Compu-Add began providing on-site service contracts as a standard feature with the purchase of computers based on Intel Corp.'s 20-MHz 80286 and all 80386 microprocessors.

At Merrick & Co., an architectural engineering firm in Los Alamos, N.M., computer systems manager Robert Allen has dropped local dealers in favor of a mail-order vendor. Allen says that when he took over the department 10 months ago, he was not pleased with the computers, which had been purchased from a local dealer, and felt he knew enough about the machines to give up local support.

"I don't need a dealer running in here every minute," Allen says. "I have used the technical support hot line a few times to figure out if a problem was in the machine or the hookup, and I have the on-site contracts but have not used them."

Marilyn Goodrich, controller at BT Venture Corp., a real estate developer in Charlotte, N.C., says she was not familiar with local-area networks when she bought a PC from a mail-order vendor, but the technical support was sufficient to install one. "I wasn't even sure what questions to ask about LANs," Goodrich says. "The technical support people were very helpful."

Most users cited the cost savings — averaging approximately 30% — as the initital impetus for buying through the mail. Most of them also said that they harbored doubts about buying from an organization located far away from them.

"We were skeptical because I had heard bad things about some mail-order houses, so we started with one computer," Goodrich says. "When the motherboard didn't work, they sent one in the overnight mail, and it wasn't like I was a large customer."

> "A LOCAL SERVICE CENTER IS ONLY as good as the people who work there."
>
> JOEY ROBICHAUX
> GEORGIA GULF

Bredin is a free-lance writer based in New York.

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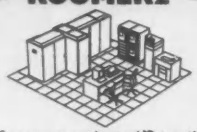
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The high cost of not training

Justifying programs requires identifying the problems they should solve

BY JANE STEIN
SPECIAL TO CW

The typical Fortune 500 information systems organization spends about $2 million a year on training. In most companies, that budget is something only a training manager could love, and it is not hard to see why. Employees are pulled from productive work to attend classes with alarming regularity; large sums of money disappear into the hands of training vendors; and the results of all this activity frequently seem ephemeral.

The fault lies in the premises on which training budgets are based. In any budget-making process, the natural tendency is to add up the cost of the things we want to do and then attempt to justify them with hopeful estimates of benefits to be reaped, such as staff hours that might be saved. This is particularly true in training because the benefits are often so difficult to assess. But this method puts the cart before the horse.

The payoff for any training expenditure is not better-trained people. The only horse that should pull the training cart is the one called "business problems." It is only by identifying the impact of inadequate skills on business problems that realistic levels of training expenditures can be established. The issue should never be the cost of training but rather the cost of *not* training.

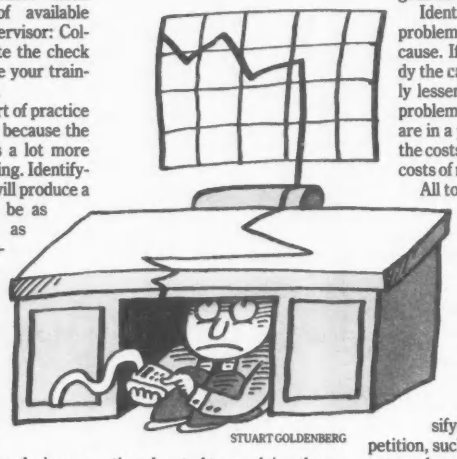
Train tracks

An impact on business problems comes in either reduced costs or increased revenue. Many training professionals, in contrast, operate on the basis of "train and hope" — they send programmers to CICS classes and hope that operations will somehow improve. However, managers cannot afford the luxury of such fuzzy thinking. They are directly responsible for operational effectiveness. It is incumbent on them to reveal how incomplete skills or knowledge prompt operational failures and to see that the lack of skills is remedied.

In most companies, the analysis of training needs consists largely, if not entirely, of polling supervisors about what skills their employees should acquire. To make collection of the information easier, trainers often supply a menu of available courses for the supervisor: Collect them and collate the check marks, and you have your training plan for the year.

Why does this sort of practice persist? Simply put, because the alternative requires a lot more work and hard thinking. Identifying where training will produce a genuine payoff can be as straightforward as tracking and analyzing end-user calls to the IS support staff. But it can also be as complex as a major study of the software maintenance backlog, which could uncover both the causes and business consequences of software design errors.

What's more, such analysis must examine not only IS expenditures but also ways in which the department's work affects spending elsewhere in the company, as well as the company's ability to generate revenue. What is the error rate in inventory control, order processing or billing? What does this error rate cost the company in lost or delayed income? On the expenditure side, what is the cost in staff time devoted to resolving the errors?



STUART GOLDENBERG

Looking at inventory control, for example, one might investigate the cost of lost sales or returned merchandise stemming from product lists that are incomplete, inaccurate or out of date.

The analysis of errors should continue to consider the extent to which they stem, for example, from a lack of skills on the part of data entry operators or to poor design of user interfaces by programmers.

Identify the business problem, the cost and the cause. If training can remedy the cause and significantly lessen the costs that the problem is generating, you are in a position to compare the costs of training with the costs of not training.

All too often, training expenses are justified by nothing more than a vague belief that training is the correct thing to be doing. Worse, in many cases, training can be a perk for a loyal and hard-working employee. In this era of intensifying corporate competition, such an approach is just not good enough.

Stein is a consultant and free-lance writer based in Arlington, Mass., and is former editor of *Data Training* and *CBT Directions*.

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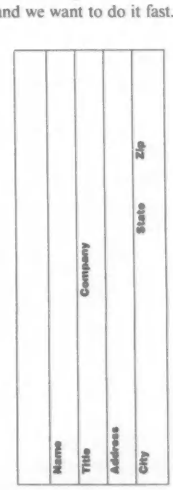
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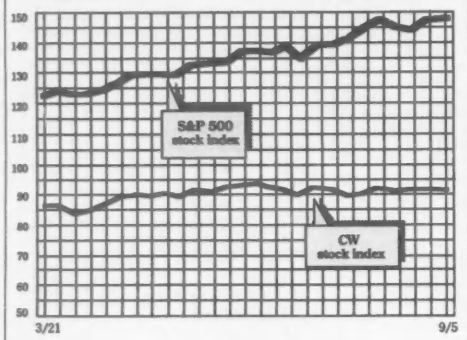
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COMPUTERWORLD

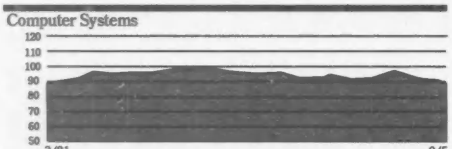
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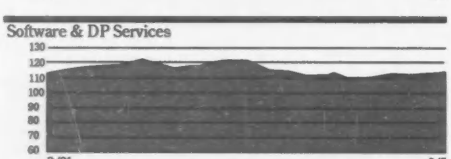
STOCK TRADING INDEX

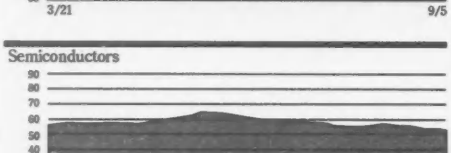


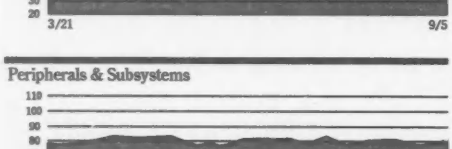
Indexes	Last Week	This Week
Communications	130.0	127.4
Computer Systems	91.8	89.7
Software & DP Services	113.0	114.2
Semiconductors	55.9	54.7
Peripherals & Subsystems	79.2	81.3
Leasing Companies	121.6	123.9
Composite Index	90.9	90.8
S&P 500 Index	147.4	148.6













Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, SEPT. 6, 1989

EXCH		52-WEEK RANGE		PRICE CLOSE SEPT. 6, 1989	WEEK NET CHNGE	WEEK PCT CHNGE
	Communications and Network Services					
N	AMERICAN INFO TECHS CORP	63	45	61.375	-0.3	-0.4
Q	ANDREW CORP	26	16	25.5	1.0	4.1
Q	ARTEL COMM CORP	9	2	7.375	-0.5	-6.3
N	AT&T	41	25	39.125	-0.9	-2.2
Q	AVANTEK INC	7	4	5.75	-0.3	-4.2
N	AYDIN CORP	19	13	18.75	0.1	0.7
N	BELL ATLANTIC CORP	100	69	97.75	0.6	0.6
N	BELLSOUTH CORP	54	39	50.75	0.1	0.2
Q	COMPRESSION LABS INC	11	3	10.5	-0.6	-5.6
Q	COMPUTER NETWORK TECH	3	1	2.469	0.1	3.9
Q	CONTEL CORP (S)	35	17	33	-31.6	-48.9
Q	DATA SWITCH CORP	7	4	4.125	0.3	6.5
Q	DIGITAL COMM ASSOC	26	17	22.5	-1.3	-5.3
Q	DYNATECH CORP	22	17	19.75	-0.8	-3.7
Q	FIBRONICS INTERNATIONAL INC	7	3	6.25	-0.3	-3.8
Q	GANDALF TECHNOLOGIES	7	4	5.875	-0.3	-4.1
N	GENERAL DATACOMM INDS	7	4	5.75	-0.1	-2.1
N	GTE CORP	61	41	60.5	0.9	1.5
Q	INFOTRON SYS CORP	13	10	9.5	-0.5	-5.0
N	ITT CORP	65	48	62.5	-0.4	-0.6
N	M A COM INC	10	6	7	0.1	1.8
Q	MCI COMMUNICATIONS CORP	42	17	39.25	1.0	2.6
N	NETWORK EQUIPMENT TECH INC	25	14	24.375	-0.3	-1.0
Q	NETWORK SYS CORP	12	8	9.25	-0.4	-3.9
N	NORTHERN TELECOM LTD	23	14	21.75	-0.5	-2.2
Q	NOVELL INC	38	24	25.75	-0.3	-1.0
N	NYNEX CORP	84	64	79.75	0.8	0.9
N	PACIFIC TELESIS GROUP	47	29	46	0.1	0.3
A	PENRIL CORP	7	3	7.125	0.3	3.6
N	PLESSEY PLC	46	25	42	0.5	1.2
N	SCIENTIFIC ATLANTA INC	21	11	20.5	-0.6	-3.0
N	SOUTHWESTERN BELL CORP	58	38	53.625	-0.3	-0.5
Q	3 COM CORP	29	12	13.5	0.8	5.9
N	U S WEST INC	74	55	70.625	0.0	0.0
	Computer Systems					
Q	ALLIANT COMPUTER SYS	6	3	4.75	0.1	2.7
Q	ALPHA MICROSYSTEMS	8	5	6.875	-0.3	-3.5
Q	ALTOS COMPUTER SYS	9	6	6.75	0.0	0.0
A	AMDAHL CORP	23	14	15.25	-0.5	-3.2
Q	APPLE COMPUTER INC	50	34	4 75	0.3	0.6
N	BOLT BERANEK & NEWMAN	17	7	8.375	0.8	9.8
N	COMPAQ COMPUTER CORP	102	50	90	-2.3	-2.4
Q	COMMODORE INTNL	20	9	9.375	-0.9	-8.5
Q	COMPUTER AUTOMATION INC	7	3	2.75	-0.1	-4.3
N	CONTROL DATA CORP	24	16	18.75	-0.1	-0.7
Q	CONVEX COMPUTER CORP	15	7	12.875	-0.1	-1.0
N	CRAY RESH INC	81	41	43.25	-1.6	-3.6
Q	DAISY SYS CORP	9	3	3.75	0.0	0.0
N	DATA GEN CORP	21	14	15.875	0.4	2.4
N	DATAPOINT CORP	6	3	5.125	0.1	2.5
Q	DELL COMPUTER CORP	13	6	6.875	-0.3	-3.5
N	DIGITAL EQUIP CORP	122	86	100	-0.5	-0.5
N	FLOATING POINT SYS INC	4	2	2	-0.1	-5.9
N	HARRIS CORP	36	25	34.875	-0.4	-1.1
N	HEWLETT PACKARD CO	62	46	51.375	-0.8	-1.4
N	HONEYWELL INC	92	57	86.75	-2.0	-2.3
N	IBM	131	108	116.75	-0.1	-0.1
Q	INFORMATION INTL INC	16	13	12.5	-1.6	-11.5
Q	IPL SYS INC	9	2	7.125	-0.3	-3.4
Q	MAI BASIC FOUR INC	19	4	4.125	0.1	3.1
N	MATSUSHITA ELEC INDL LTD	204	158	161.25	-3.9	-2.3
Q	MENTOR GRAPHICS CORP	22	12	18	0.5	2.9
N	NBI INC	4	1	1.75	-0.1	-6.7
N	NCR CORP	67	51	65.25	-0.1	-0.2
N	PRIME COMPUTER INC	21	10	10.75	-1.6	-13.1
Q	PYRAMID TECHNOLOGY	20	9	13	-1.0	-7.1
Q	SEQUENT COMPUTER SYS INC	31	14	28.625	-1.3	-4.2
Q	SHAREBASE CORP	4	1	1.375	-0.4	-21.4
Q	SILICON GRAPHICS CORP	22	14	21	0.3	1.2
Q	STRATUS COMPUTER	35	21	32.5	0.0	0.0
Q	SUN MICROSYSTEM INC	23	13	15.5	0.0	0.0
Q	SYMBOLICS INC	3	1	1.938	-0.1	-3.1
N	TANDEM COMPUTERS INC	24	12	22	-0.5	-2.2
N	TANDY CORP	49	38	46.75	1.1	2.5
N	ULTIMATE CORP	13	7	9.25	-0.4	-3.9
N	UNISYS CORP	33	20	21.625	0.8	3.6
A	WANG LABS INC	11	5	5.5	-0.3	-4.3
	Software & DP Services					
Q	AMERICAN MGMT SYS INC	19	11	12.625	0.0	0.0
Q	AMERICAN SOFTWARE INC	20	9	19.375	0.6	3.3
N	ANACOMP INC	10	5	5.75	-0.3	-4.2
Q	ANALYSTS INTERNATIONAL CORP	19	7	19	0.4	2.0
Q	ASHTON TATE	28	11	12.625	0.4	3.1
Q	ASK COMPUTER SYS INC	18	10	10.625	0.1	1.2
N	AUTO DATA PROCESSING	45	35	43.625	0.4	0.9
Q	AUTODESK INC	41	23	39.5	0.8	1.9
Q	BMC SOFTWARE INC	24	8	22.5	0.1	0.6
Q	BOOLE & BABBAGE INC	20	9	14	-0.5	-3.7
N	BUSINESSLAND INC	15	10	11.75	-0.1	-1.1
Q	COGNOS INC	9	5	5.875	-0.1	-2.1
N	COMPUTER ASSOCIATES INTL INC	22	12	17.125	0.1	0.7
Q	COMPUTER HORIZONS CORP	10	7	7	0.0	0.0
N	COMPUTER SCIENCES CORP	56	44	55.125	1.9	3.5
N	COMPUTER TASK GROUP INC	17	11	11.5	-0.5	-4.2
Q	COMSHARE INC	35	18	32.25	0.3	0.8
Q	COMPUWARE SOFTWARE	16	9	13.75	1.3	10.0
N	CULLINET SOFTWARE INC	10	4	8.25	-0.1	-1.5
N	GENERAL MTRS (CLS E)	55	39	55.125	0.1	0.2
Q	HOGAN SYS INC	7	4	6	0.0	0.0
Q	INFORMIX CORP	12	7	8.75	-0.1	-1.4
Q	INTELLICORP INC	5	3	4	-0.1	-3.0
Q	KEANE INC	19	7	17	0.3	1.5
Q	LEGENT CORP	31	16	28	-0.8	-2.6
Q	LOTUS DEV CORP	28	15	28.5	0.3	1.0
Q	MANAGEMENT SCI AMER	12	6	10.375	-0.3	-2.4
Q	MICROSOFT CORP	65	45	59.25	0.0	0.0
Q	NATIONAL DATA CORP	35	19	31.75	0.0	0.0
N	ON LINE SOFTWARE INTL INC	7	4	7	0.4	5.7
Q	ORACLE SYS CORP	19	7	18.625	0.0	0.0
N	PANSOPHIC SYS INC	18	12	15.5	-0.4	-2.4
Q	PHOENIX TECHNOLOGIES INC	19	4	5.375	0.3	4.9
Q	POLICY MGMT SYS CORP	37	21	36.75	0.8	2.1
Q	PROGRAMMING & SYS INC	20	13	19	0.3	1.3
Q	RABBIT SOFTWARE INC	3	1	0.8125	0.1	8.3
Q	RELATIONAL TECH INC	17	8	8.625	0.0	0.0
N	REYNOLDS & REYNOLDS CO	34	16	26.25	-0.3	-0.9
Q	SAGE SOFTWARE INC	10	6	7.875	0.1	1.6
Q	SEI CORP	20	16	16.75	0.0	0.0
Q	SHARED MED SYS CORP	20	14	16.125	0.0	0.0
Q	SOFTWARE PUBG CORP	29	16	25.125	0.9	3.6
A	STERLING SOFTWARE INC	9	5	8.25	0.4	4.8
Q	SUNGARD DATA SYS INC	21	13	20	1.3	6.7
Q	SYSTEMATICS INC	38	26	37.25	1.3	3.5
N	SYSTEM CENTER INC	26	13	22.5	-0.5	-2.2
N	SYS. SOFT INC	29	13	28	0.5	1.8
Q	WORDSTAR	3	2	1.813	0.2	11.6
	Semiconductors					
N	ADV MICRO DEVICES INC	12	7	8.25	-0.1	-1.5
N	ANALOG DEVICES INC	13	10	10	0.0	0.0
Q	ANALOGIC CORP	11	7	9.5	0.0	0.0
Q	CHIPS & TECHNOLOGIES INC	26	11	21.5	-1.3	-5.5
Q	INTEL CORP	34	19	30	-0.3	-0.8
Q	LSI LOGIC CORP	12	8	8.625	-0.1	-1.4
Q	MICRON TECHNOLOGY INC	26	13	14.5	0.3	1.8
N	MOTOROLA INC	62	36	55.375	-3.0	-5.1
N	NATL SEMICONDUCTOR	11	7	7.375	-0.4	-4.8
N	TEXAS INSTRS INC	47	35	39.5	-0.4	-0.9
A	WESTERN DIGITAL CORP	15	8	8.625	-0.4	-4.2
	Peripherals					
Q	ALLOY COMP	4	1	2.188	0.1	3.0
N	AM INTL INC	6	5	5.25	0.0	0.0
Q	AST RESH INC	11	7	8.125	0.9	12.1
Q	AUTO TROL TECH CORP	6	4	4.313	0.0	0.0
Q	BANCTEC INC	18	8	18	0.3	1.4
Q	CIPHER DATA PRODS INC	11	7	7.625	-0.3	-3.2
A	COGNITRONICS CORP	7	2	5.875	0.0	0.0
Q	CONNOR PERIPHERALS	15	7	11.625	0.0	0.0
A	DATAPRODUCTS CORP	18	10	12.25	-0.4	-3.0
A	DATARAM CORP	12	7	9.75	0.9	9.9
N	EASTMAN KODAK CO	52	42	48.375	-0.3	-0.5
N	E M C CORP MASS	6	3	5	0.1	2.6
Q	EMULEX CORP	12	7	7.75	-0.3	-3.1
Q	EVANS & SUTHERLAND	25	13	23.75	0.3	1.1
Q	ICOT CORP	3	1	1.625	0.5	44.4
Q	INTERLEAF INC	11	6	7	-0.5	-6.7
Q	IOMEGA CORP	5	2	2.688	0.0	0.0
Q	LEE DATA CORP	4	2	2.375	-0.1	-5.0
Q	MASSTOR SYS CORP	4	2	3.188	0.3	10.9
Q	MAXTOR CORP	12	6	12	1.9	18.5
Q	MICROPOLIS CORP	12	3	3.875	0.1	3.3
Q	MINISCRIBE CORP	11	1	2.313	0.2	7.3
N	MINNESOTA MNG & MFG CO	80	35	76	-2.3	-2.9
Q	PERSONAL COMP PRODUCTS INC	6	4	4.063	-0.4	-8.4
Q	PRIAM CORP	2	0	0.375	0.0	9.0
Q	PRINTRONIX INC	11	7	8.5	-0.1	-1.4
N	QMS INC	11	6	10.75	1.0	10.3
Q	QUANTUM CORP	16	4	15.5	1.5	10.7
N	RECOGNITION EQUIP INC	13	6	7.875	0.4	5.0
Q	REXON INC	8	6	7.125	0.0	0.0
Q	SEAGATE TECHNOLOGY	16	7	12.75	-0.4	-2.9
N	STORAGE TECH CORP	23	9	10	-0.3	-2.4
Q	TANDON CORP	2	0	0.75	0.0	0.0
N	TEKTRONIX INC	24	19	20.875	-0.8	-3.5
Q	TELEVIDEO SYS INC	1	0	0.563	-0.1	-9.9
N	XEROX CORP	69	54	66.875	-0.1	-0.2
	Leasing Companies					
Q	AMPLICON INC	115	11	13.875	-0.6	-4.3
N	CAPITAL ASSOC INTNL INC	9	5	6.75	0.4	5.9
N	COMDISCO INC	31	19	30.375	0.3	0.8
Q	CONTINENTAL INFO SYS	5	0	0.688	-0.1	-8.3
Q	LDI CORPORATION	18	13	16.75	1.0	6.3
Q	PHOENIX AMERN INC	5	3	4.25	0.1	3.0
Q	SELECTERM INC	9	5	7.5	0.3	3.4

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL; S = SPLIT

Be-labored

The end-of-summer holiday halted several climbing shares

Labor Day gave Wall Street a day of rest, but technology issues made up for the short week with a lot of action. Dataproducts Corp. announced a restructuring plan that included cutting its work force by more than 10%. The printer manufacturer had been looking for a buyer since the beginning of the year. Dataproducts fell 2⅝ points to close Thursday at 10.

Stratus Computer, Inc. has yet to return to last month's peak, which was prompted by an unsubstantiated rumor of a takeover by IBM. Stratus dropped 1½ points to finish at 31½. Motorola, Inc. slid 2⅛ to finish at 56⅛. Prime Computer, Inc. closed down 1¼ points at 10⅛, its lowest level this year. Contel Corp. split its shares this week, closing at 32⅞, off 1⅜. Blue chip issues were also lower: Digital Equipment Corp. finished down 1⅜ at 99, and IBM fell 1⅛ to 116¼.

On the upside, QMS, Inc. shot up 1 point to close at 11⅛, its highest level in the past year. Quantum quickened its pace, adding ⅞ of a point to finish at 15⅞. Merrill Lynch tapped MCI Communications Corp. to design a network management system for its worldwide telecommunications network. Investors liked what they heard; MCI climbed 1¾ points to close at 40¼. Automated Data Processing finished up ⅞ of a point at 44½.

JOSEPH J. FATTON

SNA, at 15, hits awkward age

As adolescent, it struggles to outgrow dependence, attain flexibility

BY ELISABETH HORWITT
CW STAFF

RYE, N.Y. — IBM's Systems Network Architecture (SNA), which turns 15 today, is suffering the pains of adolescence as it tries to outgrow its dependence on hosts and hierarchies and become the dynamic, flexible communications system the '90s will demand. However, SNA may reach its 20th birthday before those demands are fully met.

Several seasoned communications and IS managers praised IBM's efforts over the last few years to convert SNA from a one-host-per-user line controller to a flexible communications system that provides a foundation for their unfolding distributed processing strategies. However, users complained, IBM has yet to put meat on the bones of its peer-to-peer SNA plan, particularly in network resource management and application interoperability.

In the last five to eight years, IBM has evolved SNA into "a corporate utility which allows us to provide better sevice at a lower cost and be more flexible," said Robin Layland, a manager of SNA software engineering at The Travelers Corp. "In the old days of the 1970s, bringing on a new application practically meant a new network."

IBM's announcements in the peer-to-peer area, which began in 1977 (see time line), moved Travelers toward its ultimate goal of "having multiple hosts and devices that are not tied to applications, so you can go log on anywhere," Layland said.

LU6.2 confidence

Perhaps the biggest vote of confidence for LU6.2 has been the fact that so many major corporations are in various stages of implementing IBM's peer-to-peer networking strategy.

Chrysler Corp., for example, is on the brink of deciding whether to migrate its dealers onto OS/2 Extended Edition servers that would use LU6.2 to hook back into Chrysler's databases. Drexel Burnham Lambert, Inc. and Travelers use LU6.2 corporatewide right now and are experimenting with the potential — and possible challenges — of PU2.1, which IBM has renamed "Unit Type 2.1" or T2.1.

"We're at the stage of trying to understand T2.1," Layland said. One of the potential benefits of T2.1, he added, is that Travelers' IBM Personal Computer and Personal System/2 users will be able to set up simultaneous peer-to-peer sessions with multiple applications on multiple hosts for the purpose of data collection. "Right now, the PC can only log on to one host using LU6.2 on the old PU2 [communications protocol]."

"Right now, we are getting the network backbone in place and have application-to-application [connectivity] between mainframes," said Joseph Giannotti, department commissioner at the Computer Service Center for the city of New York. "But there are already discussions in the city of allowing peer-to-peer communications among minis or micros or simply to [allow PC users] to access multiple databases on multiple mainframes simultaneously. Then we'll see a lot more LU6.2."

Users who are contemplating serious commitment to LU6.2, however, look with increasing concern at yawning functionality gaps in IBM's products to support distributed networking. Both Travelers and Chrysler, for instance, are waiting for better tools to help them distribute applications across a peer-to-peer network of both IBM and probably non-IBM systems.

IBM has already made some moves in this direction. Its Network Packet Switched Interface has provided basic communications between Travelers' SNA users and other businesses over X.25 packet-switched connections, Layland said. The vendor has been "slow-moving but getting there" when it comes to linking SNA to industry networking standards such as Open Systems Interconnect (OSI) and Transmission Control Protocol/Internet Protocol, Chrysler engineer Marty Cummins said.

Promise unmet

However, LU6.2 has not fulfilled its promise yet of being the basis for application interoperability and portability across IBM and non-IBM systems — even though a wide range of systems now support the protocol, Layland said: "We're doing internal development for LU6.2 and T2.1, and [software] portability is a big issue for us as we figure out how to use cooperative processing. As long as we just go with one machine we're fine, but the goal is to tie various systems together."

IBM's Common Programming Interface for Communications promises to provide true portability and interoperability for applications across various systems' implementations of LU6.2 as well as between LU6.2 and OSI. However, IBM has yet to get the offering in place on all its systems (see story at left).

Cummins said he is worried about how to get users in touch with the right network resources if his company decides on widespread LU6.2 implementation: "It's no problem defining machines right down to the network address if I have LU6.2 between a couple of workstations, but what about interconnecting 6,000? I need another solution."

For the last couple of years, IBM has been experimenting on how best to respond to users in the above area, using as its prototype Advanced Peer-to-Peer Network (APPN). This network "feature," currently confined to System/36s and Application System/400s, includes many of the resource-management capabilities users need, industry sources said.

APPN would take a lot of the work out of managing and configuring "labor-intensive," traditional SNA, said David Passmore, a partner at Ernst & Young subsidiary Network Strategies, Inc. However, "moving to APPN is as radical a shift as if IBM moved to Decnet," Passmore warned.



IBM's Gray *takes long view*

Providing APPN-like functions on SNA will take time because the key is not just handling resource addressing but also providing such functions for users "with hundreds of hosts, hundreds of thousands of terminals, so at no point do we have to say, 'Well, fellows, your applications will be off for the next month while we change SNA,' " IBM Fellow Jim Gray said.

Life and times

September 1974: First release of SNA, including VTAM for IBM 370 hosts and Network Control Program (NCP).
1975: Remote access to hosts via remote Synchronous Data Link Control links; 3270 terminal support.
1977: Access to multiple hosts from one terminal; host-to-host session support.
1979: First SNA network management tools.
1982: LU6.2, or Advanced Program-to-Program Communications.
May 1986: Netview network management system.
June 1986: Advanced Peer-to-Peer Networking. SNA Low Entry Networking using T2.1 peer-to-peer links without host involvement.
March 1987: Systems Application Architecture.
January 1988: NCP support for T2.1 nodes and nondisruptive reconfiguration of SNA networks; subarea addressing maximum extended from 256 to up to 65,000 nodes.
In four to five years: True SNA-based peer-to-peer networking, with effective resource addressing, routing, etc.

A circular path to distribution

Systems Network Architecture (SNA) seems to have come full circle, back to its roots as a distributed application-to-application architecture, according to James Gray, an IBM Fellow who has been involved with the system since day one.

"Today, we think program-to-program communications has finally arrived, but it's not a new idea," Gray said. The first SNA release in 1974 was "all about how to get programs on the 370 to talk to programs on the [3600] banking controller," which typically acted as a local applications processor and communications coordinator for a group of terminals or automated teller machines, Gray said. By localizing as much applications processing as possible, such controllers cut down on user-to-host interactions by a factor of five or 10, with users saving on both host and line costs, he added.

A few months after SNA came out, however, IBM began hearing from another group of users who often had "as many as 10 separate physical networks," Gray said. These users demanded networking tools to help them save on the number of lines and terminals it took to hook users up to various applications in different mainframe environments such as CICS and TSO, he added.

For several years after, IBM targeted that group with SNA announcements such as multidrop line connections, cluster controllers and support of X.25 packet-switching networks (see time line). It has been only in the last few years that users and IBM have focused once again on tools for distributing applications, this time over a true peer-to-peer network that can operate without any host involvement at all.

IBM's first introduction of peer-to-peer networking, which came in the third SNA release in 1977, was for 370s only and was one of the primary reasons why the SNA user acceptance curve took off around that time, Gray said. As soon as SNA let users distribute applications across multiple hosts, they began to see it "as a networking technology that was important for the whole data processing life of their corporation," Gray said.

The second major move toward peer-to-peer networking took place in 1979. IBM top management issued a directive for various hardware groups to converge around a single communications architecture that would allow two intelligent processors, or two applications, to talk, recalled Donald Haile, IBM Enterprise Systems director of software systems in an interview last year. In response to this dictum, some 60 senior-level technicians got together at an IBM facility in Valhalla, N.Y., and came up with the concept of LU6.2, which defines Advanced Program-to-Program Communications, Haile said.

After much debate, the group decided that it was not practical to try to use LU6.2 to iron out the inconsistent application interfaces across various IBM systems, Haile said: "I think it was a pragmatic decision at the time." Since LU6.2 shipped in 1983, however, users have told IBM that they want their applications to be able to communicate, as well as migrate, across various IBM computing environments, he said.

IBM is attempting to respond through Common Programming Interface for Communications, an element of its Systems Application Architecture.

A consistent application interface for LU6.2 and OSI, CPIC was scheduled to be available on all major IBM systems next month, but IBM has backed off that date and has yet to provide a new schedule.

ELISABETH HORWITT

AS/400

FROM PAGE 1

migrated" along with a number of new applications in System/36 mode.

Along with the hardware, IBM unveiled a significantly updated version of the AS/400 operating system. OS/400 Release 2 promises to make System/36 and 38 migration to the AS/400 easier, while bringing the midrange standards bearer closer to IBM's Systems Application Architecture (SAA) strategy.

One user who has been running a test version of the new operating system for more than a month said he is pleased with what he sees.

"At this point, it appears far superior [to Release 1]. The code is tremendously more stable, and in our case, it's doing a good job," said George Perera, group director of MIS at Ryder Truck Rental, a division of Ryder System, Inc. in Miami.

On the crucial question of compatibility with System/36 and System/38 applications, Perera had good news. "We have some applications in System/36, some in native System/38 and some created in native for the AS/400," he said. "And aside from some minor difficulties, all are running."

Making the migration path to the AS/400 less cumbersome, particularly for System/36 users, is crucial for IBM, analysts said.

"In round numbers, there are 30,000 System/38s out there but 150,000 System/36s. The growth potential for the AS/400 is with System/36 users," said John Logan, vice-president of Boston consultancy Aberdeen Group, Inc.

ADM, a consulting firm based in Cheshire, Conn., has projected that annual worldwide shipments of AS/400s will grow to 120,000 in 1991. As an aside, IBM made official last week what had been expected for a year — that it was withdrawing the System/38 Models 5381 and 5382 from its direct marketing channel, effective Dec. 5.

For its part, IBM characterized the rollouts simply as the application of available technology to boost the price/performance of its midrange line.

"Certainly, the AS/400 is now more attractive to System/36 users," said Frank Elliott, director of midrange systems for IBM's U.S. marketing and services organization.

> "IN ROUND NUMBERS, there are 30,000 System/38s out there but 150,000 System/36s. The growth potential for the AS/400 is with System/36 users."
>
> JOHN LOGAN
> ABERDEEN GROUP

Small expectations

While IBM's policy is to not disclose sales figures — except to say that it shipped 25,000 units as of the fourth quarter last year — Elliott deflected speculation that IBM has undershot its projections for AS/400 sales to System/36 users.

Elliott did confirm that IBM had responded to requests from users on some of the new products. For example, the implementation of a C compiler in OS/400 Release 2 was "recommended a lot by IBM business partners," he said.

The compiler, which will be available in January, is also compatible with IBM's SAA. The AS/400 has the most gaps in SAA support of any IBM hardware line defined under that architecture.

For J & H Builders Supply, Inc., a C compiler is an immediate need. A retail lumber distributor in Anaheim, Calif., the company is currently moving Unix applications from an AT&T 3B2 minicomputer to its year-old AS/400 B10, explained Greg Walker, vice-president of IS. Walker said he currently must convert the C programs to AS/400 PL/1, which his department began using six months ago.

But on hearing that the C/400 will not be available until January, Walker complained, "I wish IBM would get plans off the drawing board quicker. We could use some of the stuff they've announced now."

The new operating system also includes support for Cross System Product/Application Execution, allowing an AS/400 to run applications developed in CSP on an IBM mainframe.

However, the other component of CSP, the so-called Application Development module, or CSP/AD, was not announced for the AS/400, and so programmers will not — at least, not yet — have the tools to use the AS/400 as a application development platform for larger IBM systems.

International flavor

Based on 1988 shipments, IBM has sold most of its AS/400s outside the U.S.

Model	U.S.	International
10, 20	2,700	5,500
30, 40	4,000	7,100
50, 60	3,200	5,900

SOURCE: INTERNATIONAL DATA CORP.
CW CHART: JOHN YORK

Tape capers

In introducing a new high-end tape subsystem and a marginally faster rack-mounted tape drive last week, IBM officials admitted they were responding to complaints from customers, who have bemoaned the original and sluggish 2440 half-inch reel-to-reel tape drive.

Indeed, prior to the new systems, IBM recently offered a free upgrade to a high-speed feature for the 2440.

However, several users howled at the price of the new high-end tape subsystem, the 3490, a half-inch system with a data-transfer rating of 3M byte/sec. that can be loaded with a maximum of six 200M-byte IBM 3480-type cartridges.

"We have the 2240 now, and it's extremely slow," said Joe Mager, director of MIS at Bixby Medical Center in Adrian, Mich. Mager added that he hoped the promised new drives would be in the $40,000 price range rather than the announced $53,250.

"It doesn't do anything for us," said James Foster, who oversees a half dozen AS/400s as manager of international IS at Abbott International Ltd. in Chicago. He said raw speed is less important to him than single-load capacity — "the ability to load it at 5:00 at night and have it back up the system overnight."

Foster also questioned the price of the tape drive: "Are users going to spend $50,000 or $60,000 for a tape drive if they only spent $100,000 for the entire system?"

Another user viewed it this way: "From where we stand, the tape drives are bigger than we need. I need something that's better than I have now but cheaper than those."

However, John Schiff, consulting engineer at J. D. Edwards, an AS/400 software company in Denver, praised the new drive, which he said has finally given users at the high end an option. "The 3490 is clearly a pricey box, but you're talking about large shops," he said.

For users who are unhappy with the 2440, IBM has introduced the 9348, a rack-mounted drive priced at $22,000, or $1,500 less than the 2440. Although the data-transfer rate is somewhat slower than the 2440 — 781K bit/sec. compared with 918K bit/sec. — IBM claims that the new drive will actually perform faster because it uses streaming-tape technology.

ELLIS BOOKER

Under the spotlight

Complementing its AS/400 enhancements, IBM last week rolled out a new generation of what it said are easier-to-view computer displays.

But the Infowindow terminals are not the diskless IBM Personal System/2s or OS/2 Presentation Manager-compatible terminals for Systems Application Architecture environments that IBM is said to be working on. "They're essentially the latest generation of application-specific monitors for System/34, 36 and 38 and 3270 environments," said Dataquest senior industry analyst Glenn Schiller.

Still, Schiller said the new terminals are aggressively priced and show IBM's intention to stabilize its market share, which he said has been slipping in the 3270 area to vendors such as Memorex Telex N.V.

According to Dataquest numbers, the U.S. markets for 3270- and System/34-, 36- and 38-type terminals last year were $1.3 billion and $350 million, respectively.

The new display stations for the 370, AS/400, System/36 and 38 include color and monochrome monitors with etched screens. IBM said the new screens use 75% more picture elements than previous IBM displays, resulting in crisper, more readable on-screen characters. A flat-screen model, available only in monochrome, was also introduced.

ELLIS BOOKER

System/36 resurfaces in IBM European rollout

BY AMIEL KORNEL
CW STAFF

IBM unexpectedly breathed new life into the System/36 last week as it presented European customers with a line of midrange computers that are essentially upgrades of its low-end System/36, the Model 5363.

However, U.S. customers will not find the three new models, dubbed Application System/Entry, in their IBM product catalog.

An IBM spokesman in the U.S. refused to speculate if and when AS/Entry would be offered outside of Europe.

Analysts called the pricing of the new machines — which offer expanded disk storage capacity and more main memory — aggressive. It remains unclear, however, what the move signals about the future of the System/36, a best-seller in the IBM lineup. When it was released in June 1988, the AS/400 was billed as a next-generation system that would replace the midrange System/36 products. Yet AS/Entry, despite its name, clearly extends the life of the System/36 family.

Making a go of it

"It looks like the 5363 is still viable in IBM's mind," said Peter Burris, a consultant at market research firm International Data Corp., based in Framingham, Mass.

The wording of the announcement and the new system's moniker suggest IBM marketers want AS/Entry to be viewed as a way to ease customers into the AS/400 family.

Many users of the System/36 have complained about the difficulty and cost of migrating their application software to the AS/400.

Ton Tilburgs, Frankfurt, West Germany-based chairman of IBM midrange systems users group Common Europe, estimated that 40% of current System/36 users in Europe are unwilling to migrate to the AS/400 because of high cost and the AS/400's "bad reputation" when it comes to emulating a System/36.

The European installed base of System/36s rose to a total of 104,000 units in 1988 with the shipment of an additional 20,500 machines, according to IDC Europa Ltd. consultant Martin Hingley in London. This number compares with an estimated 96,600 System/36s that had been installed in the U.S. by that time.

Big timber grapples with computer issue

BY J. A. SAVAGE
CW STAFF

There's not much similarity between a computer chip and a spotted owl. But some in the timber industry think one is getting a rap that the other really deserves.

This summer, timber workers in western Oregon took to the streets to angrily protest a series of injunctions that prevented timber firms from logging in nearby forests. The injunctions were granted in response to environmentalists' concerns that further cutting would threaten the natural habitat of the spotted owl and force the creature onto the endangered species list.

Workers who say worries over the spotted owl are costing them jobs cheered last week's move by a federal appeals court to strike down one of the injunctions.

However, experts said even more jobs are being lost to a massive computerization push by timber firms — one that will change that business as fundamentally as computers changed the automotive and steel industries.

The change is costing the timber industry more than $1.5 billion per year, according to the National Forest Products Association, an industry group. While the industry does not keep statistics, Bill Chancellor, business agent for the International Woodworkers of America Local 398 in Arcata, Calif., estimated that computerization accounts for about a 20% reduction in workers needed in an automated mill. *Forest Industries* magazine estimated that a fully computerized mill reduces its labor force by 25%.

All this is coming as a shock to the traditionally labor-intensive timber industry. Some critics charge that the industry is deflecting the blame toward the environmentalists.

For example, Sierra Pacific Industries in Anderson, Calif., gave its employees a day off last month to participate in an anti-spotted owl protest in nearby Redding.

"They'll use environmentalists as a convenient scapegoat," said Andy Alm, newsletter coordinator at the Northcoast Environmental Center in Arcata. "It's one of their best excuses."

The National Forest Products Association disputed the claims that computers are putting people out of work, although it admits to a 20% reduction in lumber-mill employees since the late 1970s. "It's just more wood per employee," said Mark Pawlicki, western regional director for the group.

But computerization is a "key factor in preserving the western region [timber industry] profitably in the future," said David Briggs, associate professor of forest products at the University of Washington. "Increasing productivity in mills is going to lead to a declining number of workers."



JOE CEMPA

Jobs are being lost *to a massive lumbermill computerization push by the timber firms*

The spotted owl controversy is "camouflage" for the real economic problem, said Andy Stahl, a forester with the Sierra Club Legal Defense Fund, based in Seattle: "The guys that have worked all their lives in mills are being told they're going to lose their job over some damn little bird."

Mills such as Bohemia, Inc. in Oregon and Potlach Corp. in Idaho have computerized everything from a log's entry to the mill to the process of transporting finished lumber to retail outlets.

Some of the most labor-intensive and backbreaking work, the sorting of logs on the conveyor belt — called "green chain" — has been eliminated by personal computer-based automated machinery.

"There used to be a zillion people out there sorting green chain, but it's a backbreaking job, and no one wants to do it," Briggs said.

Computers are also starting to determine how a log should be cut — a job that used to take a skilled sawyer with a keen eye — and taking a hand in keeping track of inventory, which used to require hordes of supervisors armed with clipboards.

In sawing a log, one of the more advanced systems, made by Applied Scanning Technology, Inc. in Mountain View, Calif., uses a series of cameras to read the log's characteristics. A Motorola, Inc. 68000-based computer defines the best cuts based on yield. It then redefines the cuts based on dollar recovery, customized for each mill. The process takes about four-fifths of a second, according to Applied Scanning's Robert Grieson, director of marketing.

While yield recovery runs 3% to 9% over manual means, dollar recovery averages 10% to 15%.

Additionally, the timber industry is in the midst of reorganizing into a global market. "Mills didn't have to be savvy in terms of marketing or efficiency before," Briggs said.

He added that it is causing a major shakeout in the industry, and the heart of the issue is whether the change will come quickly or gradually. Environmentalists, with the spotted owl debate, are influencing rapid change, which Briggs and the union said will wreak havoc on mill workers' lives.

Wang cuts

FROM PAGE 1

Westport, Conn., said his sources inside Wang report that those laid off last week numbered closer to 2,000, with another 5,000 due to lose their jobs within the next year.

Cutting the work force by 3,000 this year is a conservative figure, several analysts agreed. They expect Wang's employee base to shrink by 6,000 to 7,000 overall.

Henning declined to give further specifics of the layoff plans. Wang will announce its official employee "body count" when the first fiscal quarter ends later this month, he said.

"Our first priority is to get the company in a more financially stable position," Henning explained. "We're not approaching this [as though] tomorrow we cut 15% of the work force. That would be a silly way to do it."

Employees returning from the Labor Day weekend found more than pink slips in their mailboxes. The company also had a new boss — Miller.

Wang's new CEO is reportedly streamlining executive meetings by refusing to tolerate latecomers and by chopping short presentations that ramble away from the point.

"The mood I've heard from a few people in Wang is basically positive," said Robert Cameron, an industry analyst at Dataquest, Inc. "Their jobs may be at risk, but they feel like somebody in the house is doing something."

During Miller's first weeks on the job, Henning said, every organizational department within the company — research and development, sales and marketing, manufacturing and administration — will be submitting trimmed-down budgets.

Although R&D and sales may have greater protection than Wang's weighty overhead and management, "there are no sacred cows," Henning said.

Industry analysts hailed the accelerated work force reduction as a long overdue and necessary step. "The company is adjusting the size of the cloth to the size of the body," said Michael Geran, a financial analyst at Nikko Securities Co. International in New York.

"Over the next few years, I think we will see Wang become an entirely different company, much smaller and much more specialized," agreed Judith Hurwitz, a senior consultant at Patricia Seybold's Office Computing Group in Boston.

Wang's giddy years of rapid growth pushed its corporate structure out of control, bloating middle-management salaries and spawning a burgeoning bureaucracy, Hurwitz noted.

The $3 billion company now spends $1.14 billion on overhead costs — 38% of its revenue, according to Steve Wendler, program director at Gartner Group, Inc. in Stamford, Conn.

Cutting that figure back to the industry average of 25% would mean paring away $390 million. When Unisys Corp. shed $400 million in overhead costs, the firm eliminated about 6% of its work force, Wendler said.

Although drastic cuts in the work force may cut costs in the long term, the short-term bill will be a whopper, Christiansen said. "You just don't get rid of 2,000 people without any related costs," he explained. "There's vacation time to be paid; severance checks, based on years of service; outplacement services for some."

According to the company's year-end report to shareholders, Wang spent $234 million last year in restructuring costs associated with eliminating the 3,200 jobs, with a substantial part of that money earmarked for severance pay.

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CORRECTIONS

Candle Corp.'s mainframe data conferencing system was incorrectly listed under local-area networks in the networking section [CW, July 31].

In the Aug. 28 issue, the article headlined "Micro Channel machines still in high demand" should have compared *all* IBM Intel Corp.-based 80286- and 80386 computer retail sales to percentages representing all comparable Compaq Computer Corp. sales. The article incorrectly credits solely IBM's Model 50Z with IBM's total 40.2% share of the retail 286 market. It also incorrectly credits the Model 70 with all of IBM's 38.4% share of the retail 386 market.

TRENDS

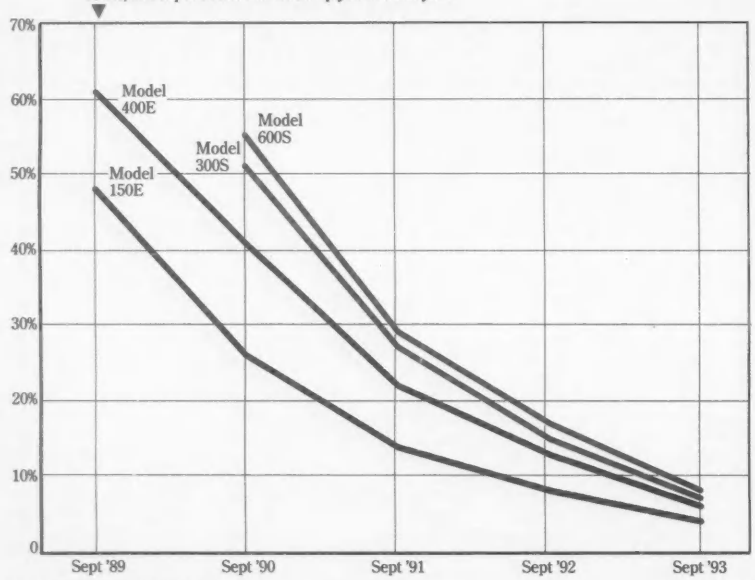
IBM 3090 residual values project the fair-market retail value of selected processors

Users are hanging on *to their 3090 E models as they await the arrival of the new 3090s and Summit series. This will gradually reduce the number of E models entering the used marketplace, keeping their prices higher than expected.*

Model	List price in thousands	Residual values in thousands				
		Sept '89	Sept '90	Sept '91	Sept '92	Sept '93
150E	$1,712	$815	$443	$243	$132	$67
400E	$8,736	$5,320	$3,617	$1,904	$1,101	$489
120S	$1,028	*	$375	$164	$86	$42
180S	$2,973	*	$1,481	$752	$416	$181
300S	$6,955	*	$3,561	$1,843	$1,036	$473
600S	$12,869	*	$7,065	$3,732	$2,136	$1,030

* S models introduced in 1989

This waiting game *has put pressure on the 3090 S series, whose prices will decline sharply in the next year.*



SOURCE: COMPUTER ECONOMICS, INC. (UNLISHED) CALIF.

CW CHARTS: JOHN YORK

NEXT WEEK

An increasing number of firms are coming to regard their current IS operations as dragon-like creatures that eat money and block the path to progress. Some IS execs believe that the best way to conquer the beast is to cut off some of its functions and feed them to outside service providers. Read about the risks and rewards of outsourcing in In Depth.



MARK STEELE

Mainframe, midrange, supermini — where does one begin and another end? The first part of *Computerworld's* annual Hardware Roundup on large, medium-scale and special-purpose systems will help alleviate the confusion as it looks at changes in the industry's high end as well as the ups and downs systems vendors faced in the last year.

INSIDE LINES

You didn't want it; now you can't get it

That seems to be the story with OS/2 Standard Edition from IBM, reports a large West Coast user. You'll recall that IBM's Officevision announcement emphasized OS/2 Extended Edition and barely mentioned Standard Edition. Now, Standard Edition is getting scarce, one user says. IBM is "making it almost impossible to buy SE this summer," the user adds.

PSSSSSS/2 — pass it on

According to the rumor mill, IBM is going to open its Micro Channel Architecture kimono very wide this fall, making technical specifications and other information more available than ever in an effort to spur more MCA clone development. Not only that, but one source also claims IBM is eager to spread the news about this prior to the announcement.

Keep the installed base satisfied

Wang Laboratories will announce a new addition to its proprietary VS line of minicomputers today with the VS8000 series. Expected to ship within the next three months, the new machines are seeking a niche in Wang's installed base between the VS5000 and VS10000 line. Chris Christiansen, an analyst at Meta Group in Westport, Conn., said the 8000 series is essentially a "repackaged" 7000 based on CMOS technology. The new line will reportedly offer up to 6 million instructions per second and twice the price/performance of the 3-year-old VS7000 line.

Not a Dunn deal

Former Prime Chairman David Dunn denied last week that an early November purchase of some $1 million worth of Prime stock constituted proscribed insider trading. In a newspaper interview, Dunn confirmed that he and Idanta Partners, the investment firm he founded and heads, bought the stock shortly after Prime turned down MAI Basic Four Chairman Bennett LeBow's first — and private — offer to buy Prime. However, Dunn reportedly contends that the offer — an informal, unsolicited bid from a company far smaller than Prime — wasn't taken seriously.

Mail-order mainframes?

While several personal computer vendors are rushing to put Intel I486-based systems and upgrade boards on the market, some are worrying about who is going to sell the hardware. "It's a minicomputer-class of machine, no doubt about it," said Michael Krieger, senior manager of advanced technologies at AST Research. "There is a range of users that will want that platform for Xenix, 16 to 20 multiuser systems and sequential-server environments, for example. Those are not the kind of applications that are sold by mom-and-pop computer stores." Vendors may be forced to pick up some of the service and support tab, Krieger said.

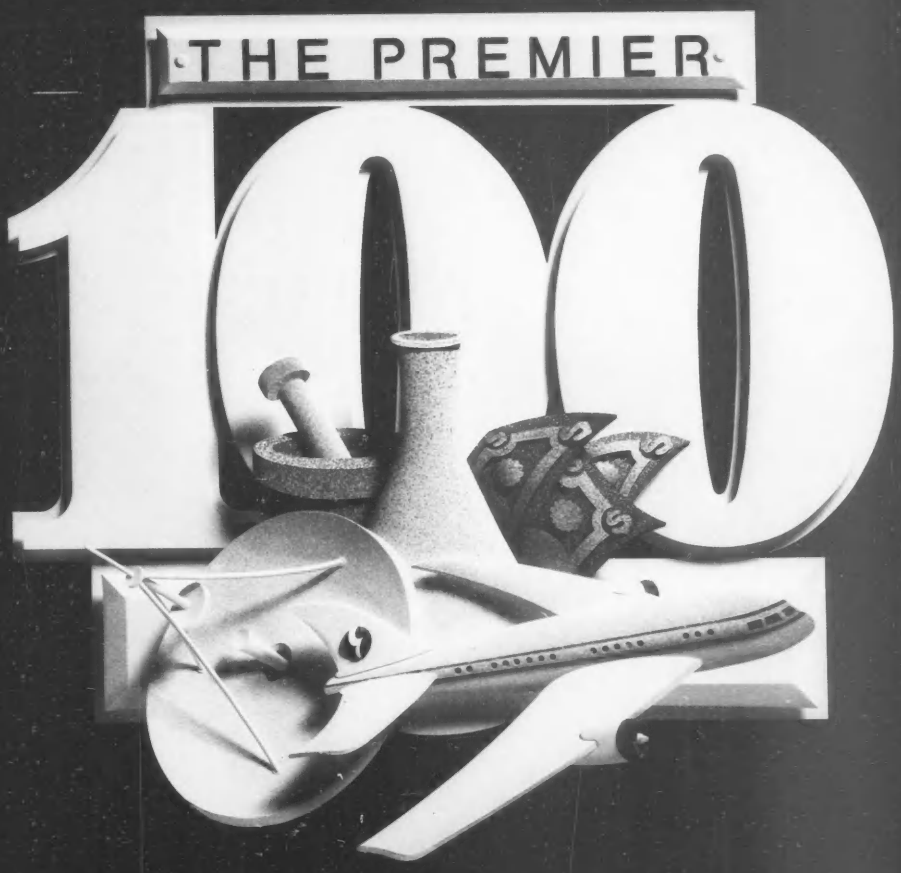
Back from boat anchor-land

The IBM 9370, wearer of many ill-fitting hats, is due to appear soon as a Professional Office System server that could eliminate response-time problems associated with processing electronic mail messages through VTAM and NCP, according to Forrester Research President George Colony. In this role, the 9370 could meet the needs of a few users with gigantic Profs networks. However, it is less likely to succeed if IBM decides to pit the system against a new breed of servers optimized for networking, Colony said. Upstarts like Tricord and Netframe are causing some consternation within IBM and elsewhere: Netframe, for example, has reportedly caught the interest of Kodak as a possible alternative to the 3Com-based LAN strategy the company is considering.

Lotus has scheduled a briefing this week, but it apparently still won't be talking about the database products it announced in April 1987 and hasn't discussed since. With the 2½-year anniversary of that announcement approaching, we tip our hat to Lotus. Lotus/DBMS' longevity is to industry vapor lists what DiMaggio's 56-game hitting streak is to baseball. If you hear a tip about Lotus/DBMS or any other legends, give a call to News Editor Peter Bartolik at (800) 343-6474 or, in Canada and Massachusetts, (508) 879-0700. Or you can prowl through our bulletin board at (508) 626-0235.

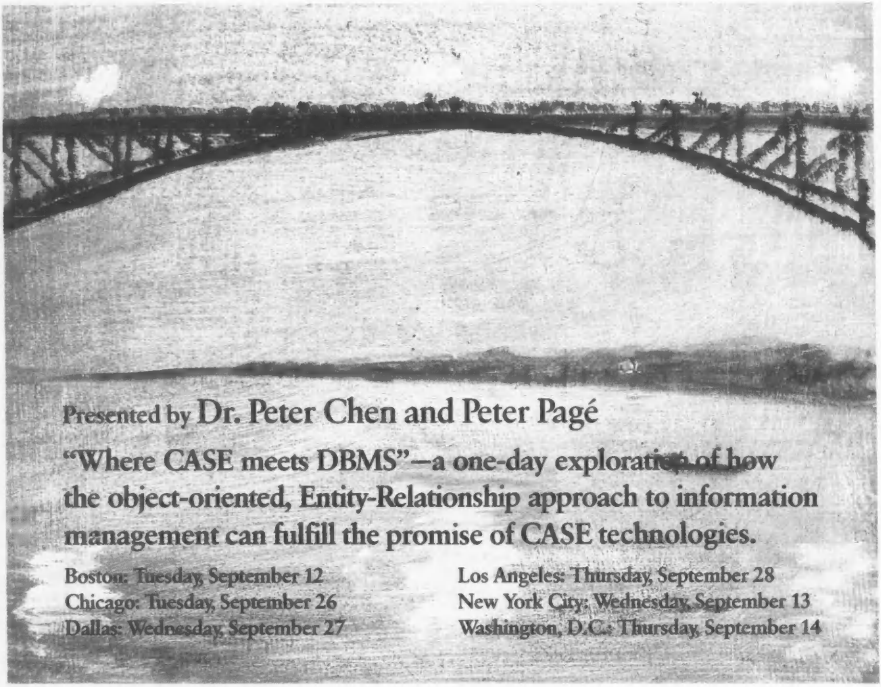
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COMPUTERWORLD



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- Timken's IS beats back Japanese competitors
- American and Baxter fight to keep their edge

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Peter Pagé—Executive Vice President of Software AG, the first major systems software company to develop extended data base technology based on the Entity-Relationship model.

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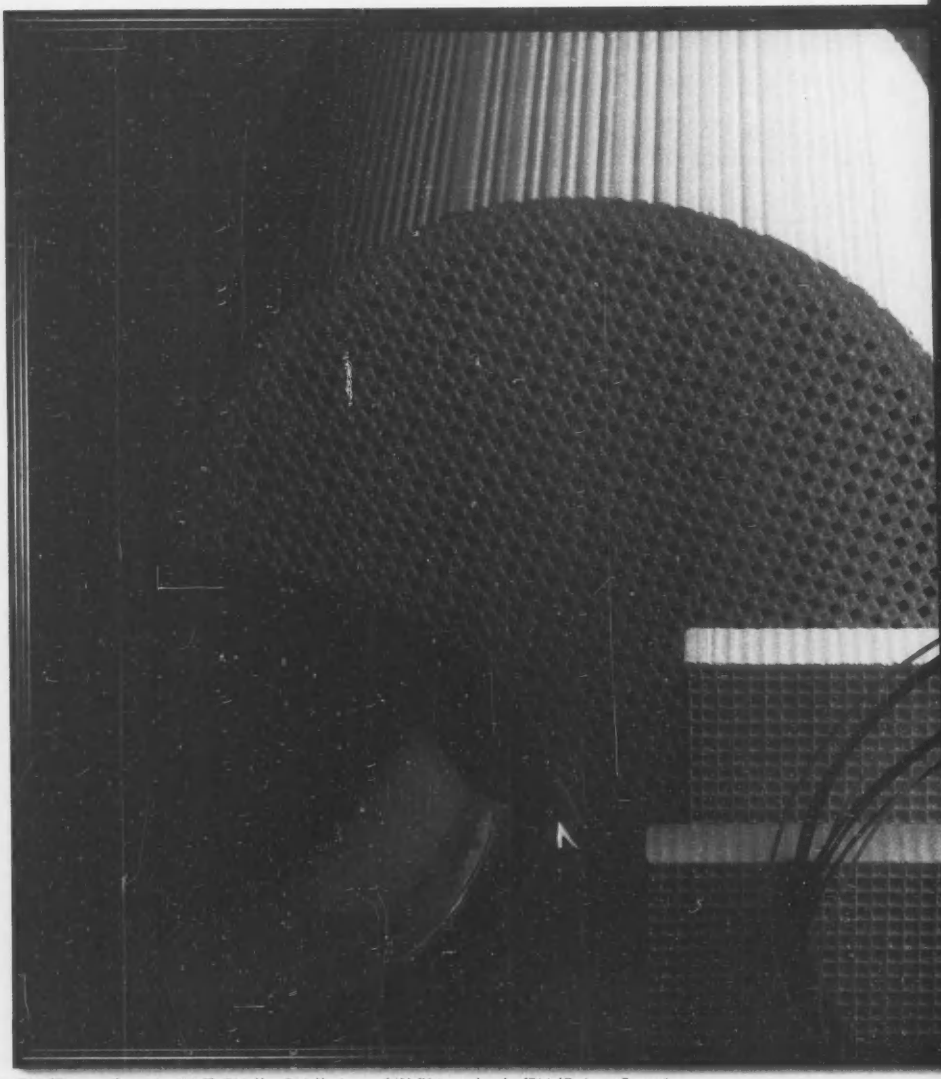
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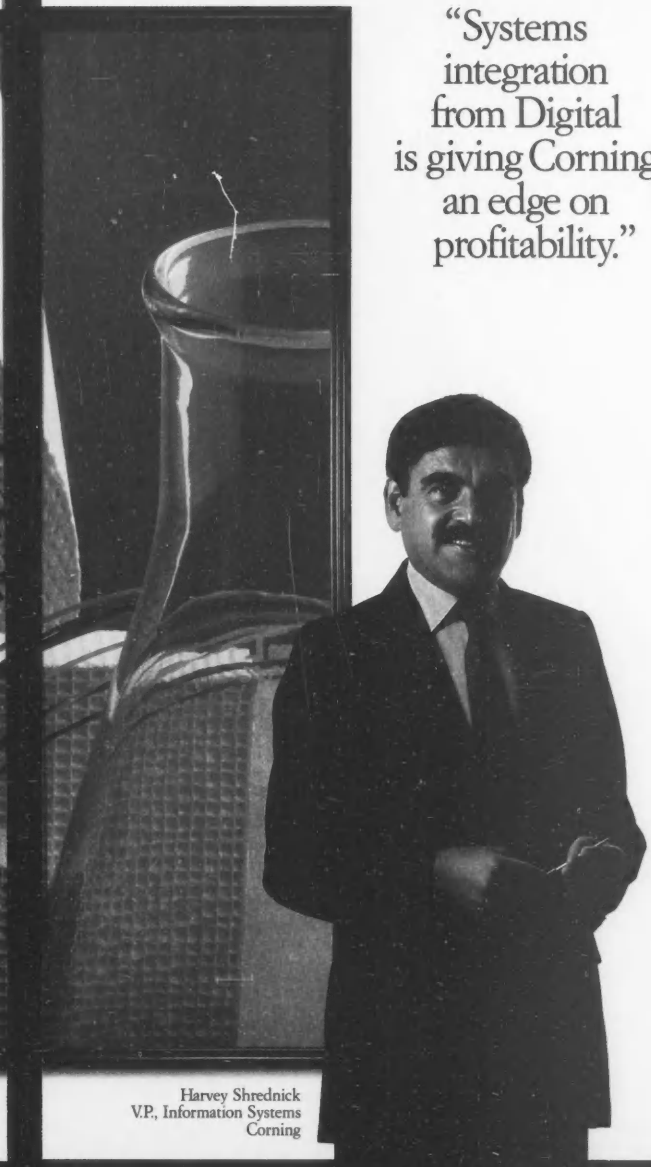


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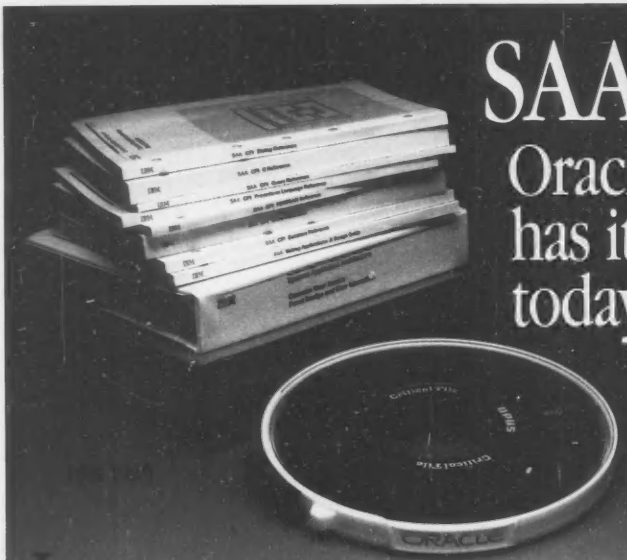
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1: IBM Journal of SAA 2: DATAPRO survey, August 1988, companies with sales over $10 million 3: Donaldson, Lufkin & Jenrette report

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EDITOR'S NOTE



The Computerworld Premier 100 Team

Bill O'Connell

Ever since *Fortune* magazine unveiled its 500 list 34 years ago, the world of business has been inundated with rankings of nearly every conceivable nature. The allure of these lists is their promise to fill our seemingly insatiable need to find our position among our peers: Where, we all want to know, do we stand?

Until now, information systems has had no useful or valid list with which to measure itself as a discipline. While managers search for ways to prove the value of technology, finding a way to measure that value has proved especially difficult. Looking at budget or systems value alone reveals who the big spenders are — not the most successful users. That's hardly an argument to impress the CEO.

We need more definitive measures, which is the reason for the *Computerworld Premier 100* list. We rank the most effective IS users not by how much they spend but by how they rate according to six carefully selected and researched criteria.

After our first ranking appeared last year, many IS managers used these measures to bolster their budget presentations to upper management. They drew on the *Premier 100's* industry comparisons — this year expanded to 13 categories — to show the value of their work.

We offer not only the numbers on the charts but also revealing profiles of the leading IS users in each industry. How do these top-rated users apply technology to meet demands? How do they translate a position on the list into competitive advantage for their companies? The data on each company's IS operation, combined with the insights of these industry-leading IS managers, provides a concise yardstick and a path to follow for success.

In short, the *Computerworld Premier 100* presents a snapshot of the 1989 IS world and reflects the volatility of corporations and their IS strategies.

Bill Laberis

Editor in Chief

Mike Sullivan-Trainor

Senior Editor

Leaders Go Beyond Basics, Link IS to Business Strategy

By Michael L. Sullivan-Trainor



Beata Sapura

In a world where nearly everyone knows how to apply technology, gaining a competitive advantage with information systems is no longer enough to guarantee long-term success. In fact, arming the corporate arsenal with IS resources that support revenue-producing programs is a matter of survival.

For this reason, the most effective users of IS in 1989 — as reflected by the companies in this year's *Computerworld Premier 100* — are not companies that merely grasp the idea that technology is vital. They are the companies that know how to closely integrate IS with business strategy and culture.

Many of these companies shifted position in the 100 list between 1988 and '89, reflecting overall changes in the corporate business climate and the volatility of key information systems factors. These include total IS spending compared with competitors, the market value of installed systems, increases or decreases in staff and training investments and the total distribution of personal computers and terminals throughout the corporation.

MCI, this year's No. 1 company, reflects many of the trends found throughout the 1989 *Premier 100*. With significant increases in both revenue and profits, the company continues to gain ground on archrival AT&T. One of the major reasons for this success is a savvy marketing strategy that is reliant on IS, particularly expert systems used for sales prospecting.

The long-distance carrier's IS was bolstered by a 27% budget increase — $61 million over last year — and a 44% increase in installed value — $54 million over last year. MCI's efforts to distribute technology access to the work force include 26,500 PCs and terminals — more than one for each employee.

Bankers Trust, which showed the largest profit increase of any Fortune 500 service company in 1988, also focuses on distributing technology to its work force. However, its key to success is profit center-oriented business management matched by a decentralized IS structure.

Bankers Trust is the first bank to have implemented such a strategy, and its decentralization provides flexibility to meet changing business conditions.

Another challenge facing *Premier 100* companies is the need to extend their competitive advantage. For example, both AMR and Baxter Healthcare must provide new systems capabilities for their well-established competitive systems to sustain their own growth and stay ahead of the pack.

AMR, parent company of American Airlines, adds value to its information systems by creating new IS businesses such as selling information services to other airlines and hotel and car-rental companies. Max D. Hopper, an AMR senior vice-president, not only maintains his leadership over IS areas but manages

corporate direction as well.

Baxter's approach is different. Rather than turning to other companies as customers for IS services, the health-care products manufacturer and distributor looks internally to further distribute and migrate technology. The company emphasizes reducing product costs and lead times by moving IS closer to the business areas responsible for those functions.

For example, Baxter increased its terminals and personal computers by 44% this year to further that goal.

Other companies are succeeding despite being swept up in takeover battles or mergers. Often these management struggles lead to a trimming of the fat and more cost-effective use of IS.

For example, a leveraged buyout cut Union Texas Petroleum free of a large conglomerate and allowed the company to focus IS initiatives more closely on business needs.

Gillette went through similar turmoil, emerging victoriously after two hostile takeover attempts. The result for IS is a new set of projects aimed at key company goals.

A company's ability to focus on what it needs to accomplish on the business side can determine the effectiveness of IS.

For example, Timken's dedication to a single line of steel products allows the company to implement computer-integrated manufacturing systems that produce higher quality products more quickly than the competition. The result has been Timken's continued success in taking business away from Japanese competitors both here and in Japan.

The ways in which companies succeed as users of IS vary as widely as the strategies revealed in the following pages. Despite these different approaches, however, it is clear that the mandate for the 1990s is to integrate IS more closely with the business and provide all the flexibility and diverse resources that linkage implies.

How We Rank the 100

IS effectiveness is determined by how well a company executes its technology plans against competitors; how current it keeps its arsenal of equipment; to what extent it trains and manages the IS staff; and to what extent employees have access to technology. These factors, along with long-term profitability, indicate how effectively IS is used within a given corporation.

Each year, the *Computerworld Premier 100* ranks companies on how well they perform in these areas in relation to their peers.

Annual IS budget as a percentage of revenue, the first criterion, is not evaluated alone. It is compared with industry averages from a survey of Fortune 1,000 companies. The difference between the company and industry ratios is ranked, and the score is weighted by a factor of 30.

The second criterion, the market value of systems as a percentage of total revenue, reveals the currentness of equipment and is weighted by a factor of 15.

The third criterion, five-year company profitability, recognizes the relationship of IS and business performance. This is weighted by a factor of 15.

Managing staff costs is vital i this age of corporate takeovers and mergers. The staff spending criterion awards more points for lower staff costs and weights the result by a factor of 10.

IS managers must advocate for training to keep their staffs up to date. The training criterion measures the amount of IS budget devoted to that area, weighting it by a factor of 15.

The requirement to provide user access to technology is measured as the ratio of PCs and terminals to total employees, weighted by a factor of 15.

Top Companies Shift Tactics

In their quest to marry IS strategy to their company's business goals, the *Premier 100* companies are changing the ways they invest in and distribute technology. They are also focusing on new system development and changing the areas of concentration of their staffs. Survey results from these firms reveal the following trends:

- Booming 1988 profits were matched by a strong commitment to IS in the form of a 13% overall increase in 1989 spending. IS budgets increased from $26 billion to $30 billion for firms that were scored in the second annual *Premier 100* ranking. Each firm increased its budget an average of slightly more than 9% from 1988.

- The companies are shifting a portion of their IS investments from large-processor applications to ones running over networked personal computers. Of these firms, 83% say they are moving applications to PC networks, with an average of 10 major applications being downsized at each company.

- The applications development staff — the focal point for creating competitive advantage — reaped the benefits of the cutbacks in other areas, with 59% of the companies reporting increases in that area. While spending on staff increased by only 0.5%, 50% of the companies reported cutbacks in operations personnel. Data communications also received a boost, with 17% of the companies adding staff to handle increased network support.

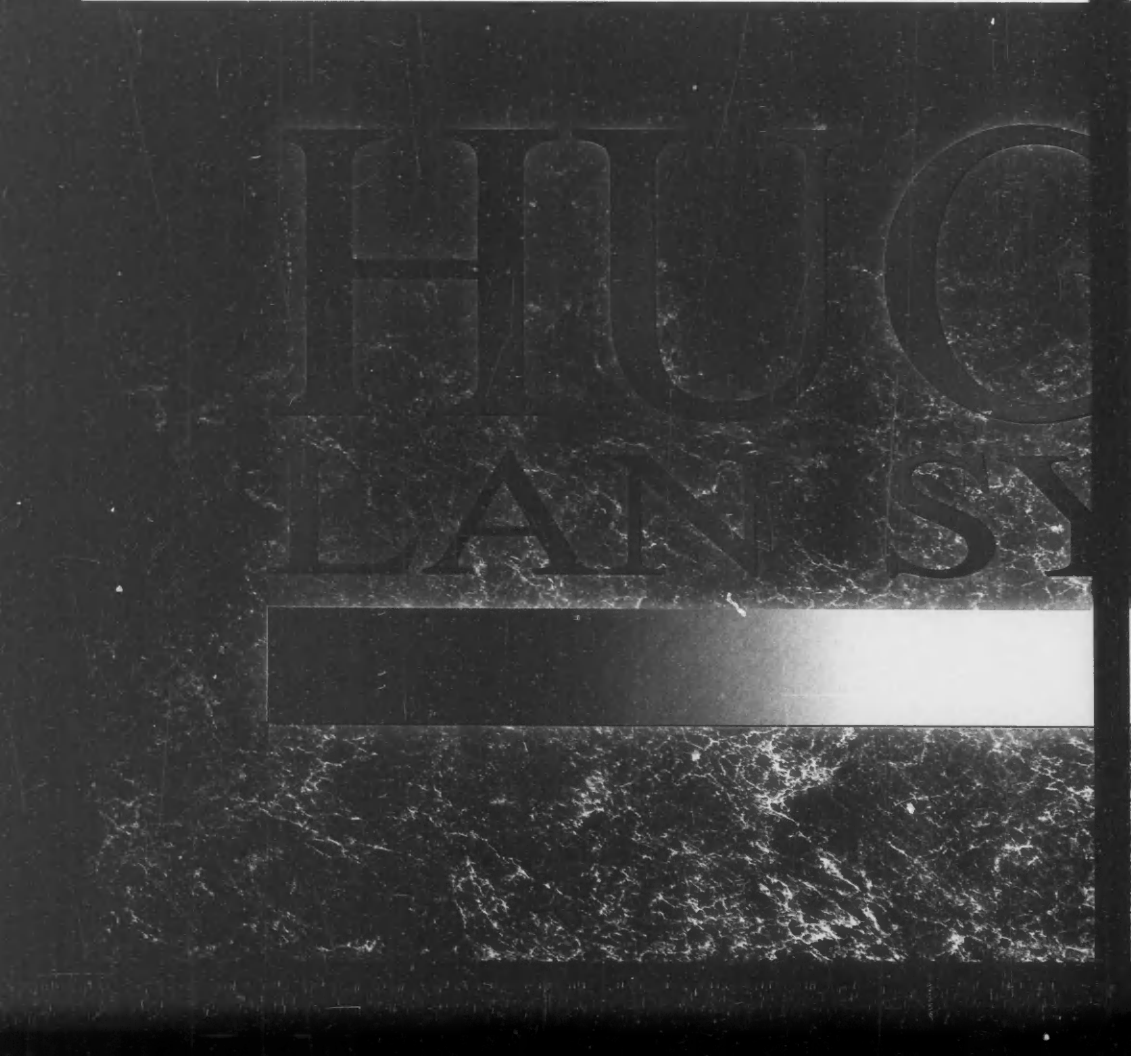
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The 100 Most Effective Users of Information Systems

Overall rank	Company IS executive	Industry	Industry rank	Total score
1	**MCI Communications Corp.** Allan Ditchfield, Senior VP	Utilities	1	29,835
2	**GTE Corp.** Dennis J. Murphy, Director	Utilities	2	29,295
3	**AMR Corp.** Max D. Hopper, Senior VP	Transportation	1	29,020
4	**Bankers Trust** Carmine Vona, Executive VP	Banking	1	28,740
5	**Banc One Corp.** Dave Van Lear, President, Services Corp.	Banking	2	28,501
6	**General Dynamics Corp.** Ken Wang, Director	Aerospace	1	28,500
7	**Security Pacific Corp.** John Singleton, President, Automation Co.	Banking	3	28,220
8	**Baxter Healthcare Corp.** Michael S. Heschel, Corp. VP	Equipment & Materials Manufacturing	1	28,075
9	**Contel Corp.*** Ken Bottonari, VP	Utilities	3	28,030
10	**Gillette Co.** Herbert W. Moller, VP	Consumer Products	1	27,925
11	**American President Cos. Ltd.** James Marston, Senior VP	Transportation	2	27,820
12	**Northrop Corp.** W. Richard Howard, VP	Aerospace	2	27,740
13	**Gencorp, Inc.*** Linda George, Director	Aerospace	3	27,605
14	**Bell Atlantic Corp.** Joe Ambrozy, VP	Utilities	4	27,565
15	**Norwest Corp.** John Geiken, Group Head	Banking	4	27,450
16	**Dow Chemical Co.** Hans Huppertz, VP	Chemicals	1	27,225
17	**Timken Co.*** Peter Kost, Director	Industrial & Automotive Products	1	27,120
18	**Lockheed Corp.** Dean Allen, Director	Aerospace	4	26,985
19	**Union Texas Petroleum Corp.** Richard L. White, Director	Petroleum	1	26,905
20	**Grumman Corp.** J. Thomas Kelly, Director	Aerospace	5	26,880
21	**Southwestern Bell Corp.** Kenneth Bender, VP	Utilities	5	26,850
22	**Abbott Laboratories*** Kenneth Farmer, VP	Pharmaceuticals & Food	1	26,795
23	**AT&T*** William Garrett, VP	Utilities	6	26,720
24	**3M Co.** Donald Siegfried, Executive Director	Equipment & Materials Manufacturing	2	26,645
25	**American Express Co.** Garland Cupp, Executive VP, TRS	Financial Services & Insurance	1	26,610

* Estimates are from *Computerworld* sources, not the company

Estimated IS budget (millions)	IS budget as % of revenue	Estimated IS value (millions)	IS value as % of revenue	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals as % of employees
$285	5.55%	$177	3.45%	43%	6%	26,500	166.67%
$750	4.56%	$200	1.22%	37%	5%	76,000	47.50%
$1,225	13.88%	$78	0.88%	19%	2%	112,615	165.85%
$370	6.32%	$70	1.20%	40%	1%	7,800	62.40%
$170	6.22%	$60	2.19%	36%	5%	10,000	59.17%
$550	5.76%	$250	2.62%	40%	2%	27,000	25.94%
$440	5.19%	$150	1.77%	49%	1%	29,500	70.41%
$250	3.64%	$60	0.87%	30%	6%	36,000	57.32%
$150	5.06%	$50	1.69%	38%	5%	5,000	22.52%
$96	2.68%	$80	2.23%	50%	5%	7,540	25.22%
$110	5.18%	$20	0.94%	26%	1%	3,400	80.95%
$380	6.56%	$125	2.16%	55%	5%	21,800	46.98%
$40	2.12%	$15	0.79%	35%	5%	5,879	39.46%
$635	5.84%	$385	3.54%	40%	3%	53,000	65.43%
$110	4.44%	$42	1.70%	40%	3%	14,500	92.95%
$315	1.89%	$80	0.48%	32%	5%	28,000	51.57%
$35	2.24%	$18	1.14%	40%	5%	11,640	66.90%
$450	4.25%	$200	1.89%	38%	3%	39,000	41.89%
$16	1.44%	$19	1.72%	46%	1%	1,600	88.89%
$253	7.05%	$72	1.99%	46%	2%	14,844	45.12%
$366	4.33%	$249	2.95%	36%	1%	55,850	84.62%
$125	2.53%	$125	2.53%	35%	5%	14,000	36.55%
$600	1.70%	$600	1.70%	36%	5%	89,000	29.31%
$517	4.89%	$160	1.51%	48%	7%	41,500	50.18%
$1,000	4.36%	$400	1.74%	23%	5%	72,000	78.09%



The 100 Most Effective Users of Information Systems

Overall rank	Company IS executive	Industry	Industry rank	Total score
26	**Sara Lee Corp.** Vincent H. Swoyer, VP	Pharmaceuticals & Food	2	26,535
27	**Farmers Group, Inc.** Edward A. Terhar, VP	Financial Services & Insurance	2	26,410
28	**Northeast Utilities** Tod O. Dixon, VP	Utilities	7	26,405
29	**McDonnell Douglas Corp.** Ernie Ridenhour, VP	Aerospace	6	26,325
30	**US West** Andrew T. Eiseman, Manager	Utilities	8	26,300
31	**Polaroid Corp.** Al Hyland, Director	Consumer Products	2	26,285
32	**Monsanto Co.** Leonard A. Cohn, VP	Chemicals	2	26,275
33	**Atlantic Richfield Co.** John F. Coman, Manager	Petroleum	2	26,195
34	**United Technologies Corp.** John Hammitt, VP	Aerospace	7	26,135
35	**Nationwide Mutual Ins. Co.*** D. M. Fullerton, VP	Financial Services & Insurance	3	26,045
36	**McGraw-Hill, Inc.*** Richard Shriver, Senior VP	Consumer Products	3	25,995
37	**Macmillan Publishing Co.** John Leo, President	Consumer Products	4	25,870
38	**Textron, Inc.** Cecil Labhart, VP	Aerospace	8	25,865
39	**Sovran Financial Corp.** Terry L. Eikenbery, Exec. Officer	Banking	5	25,820
40	**Great Northern Nekoosa*** John Coccagnino, Director	Equipment & Materials Manufacturing	3	25,745
41	**Sipco, Inc.*** James D. Fortier, Director	Pharmaceuticals & Food	3	25,705
42	**Rockwell International Corp.** James Sutter, VP	Aerospace	9	25,650
43	**RJR Nabisco, Inc.*** Tom Zoeller, Staff VP	Pharmaceuticals & Food	4	25,636
44	**Dun & Bradstreet Corp.** Michael Field, Executive VP	Diversified Services	1	25,635
45	**Valley National Corp.** Richard Picard, Senior VP	Banking	6	25,570
46	**Federal Express Corp.** Ron J. Ponder, Senior VP	Transportation	3	25,540
47	**Northwestern Mutual Life*** Edward A. Flitz, VP	Financial Services & Insurance	4	25,535
48	**Paine Webber Group, Inc.** Donald B. Marron, President	Financial Services & Insurance	5	25,520
49	**Unocal Corp.** Gordon Dolfie, Director	Petroleum	3	25,440
50	**Johnson & Johnson*** Raymond Giovannelli, VP	Pharmaceuticals & Food	5	25,395

* Estimates are from *Computerworld* sources, not the company

Estimated IS budget (millions)	IS budget as % of revenue	Estimated IS value (millions)	IS value as % of revenue	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals as % of employees
$242	2.16%	$26	0.23%	27%	6%	85,000	95.40%
$53	4.43%	$13	1.10%	70%	14%	15,875	102.37%
$71	3.43%	$114	5.47%	39%	6%	4,645	50.49%
$786	5.21%	$171	1.13%	36%	5%	60,000	51.33%
$250	2.71%	$275	2.98%	52%	2%	82,713	119.70%
$61	3.27%	$30	1.61%	44%	1%	4,800	39.02%
$168	2.03%	$135	1.63%	30%	2%	12,000	25.16%
$257	1.46%	$40	0.23%	48%	2%	16,000	60.38%
$814	4.50%	$217	1.20%	47%	0.3%	32,100	17.04%
$130	6.25%	$69	3.30%	70%	5%	5,000	67.87%
$125	6.88%	$125	6.88%	40%	3%	4,273	26.54%
$90	8.83%	$35	3.43%	65%	12%	3,500	37.23%
$235	3.23%	$60	0.82%	41%	1%	21,000	34.71%
$110	4.93%	$32	1.42%	35%	5%	4,000	27.78%
$43	1.20%	$43	1.20%	40%	2%	11,266	57.48%
$31	0.97%	$42	1.31%	41%	3%	1,948	36.06%
$440	3.63%	$165	1.36%	32%	4%	34,800	30.47%
$240	1.42%	$60	0.35%	45%	5%	50,000	42.78%
$200	4.69%	$130	3.04%	45%	5%	20,900	31.91%
$53	4.62%	$10	0.87%	40%	1%	8,422	110.82%
$200	4.71%	$66	1.56%	47%	2%	10,000	20.58%
$135	2.52%	$54	1.01%	46%	2%	6,645	76.84%
$190	7.56%	$12	0.48%	48%	2%	2,200	16.92%
$142	1.61%	$78	0.88%	36%	1%	8,600	47.25%
$200	2.22%	$60	0.67%	45%	5%	20,000	25.06%



The 100 Most Effective Users of Information Systems

Overall rank	Company IS executive	Industry	Industry rank	Total score
51	**Kemper Corp.*** Robert Tarjan, Senior VP	Financial Services & Insurance	6	25,350
52	**Berkshire Hathaway, Inc.*** Tom Trotter, Director	Consumer Products	5	25,305
53	**Nortek, Inc.*** Regina Winkfield, Administrator	Equipment & Materials Manufacturing	4	25,205
54	**Becton Dickinson & Co.*** Hank Willen, Corporate Director	Equipment & Materials Manufacturing	5	25,175
55	**J.C. Penney Co.** Dave Evans, VP	Retailing	1	25,155
56	**Ingersoll-Rand Co.** Bob Morris, Group Manager	Industrial & Automotive Products	2	25,145
57	**Merck & Co.*** Albert Cinorre, VP	Pharmaceuticals & Food	6	25,125
58	**The Mead Corp.*** John Langenbahn, VP	Equipment & Materials Manufacturing	6	25,120
59	**Temple-Inland, Inc.*** Dennis Caldwell, Director	Equipment & Materials Manufacturing	7	25,100
60	**Mobil Corp.** Bill Halpern, Manager	Petroleum	4	25,030
61	**Amoco Corp.** John R. Reid, General Manager	Petroleum	5	24,990
62	**North Amer. Philips Corp.*** Einar Kloster, President	Equipment & Materials Manufacturing	8	24,966
63	**Owens-Corning** William Boeschenstein, President	Equipment & Materials Manufacturing	9	24,965
64	**Burlington Holdings, Inc.** E. Ritchie Fishburne, Director	Equipment & Materials Manufacturing	10	24,890
65	**Masco Corp.*** Thomas Roy, Director	Consumer Products	6	24,875
66	**Lafarge Corp.*** Ken Hill, Manager	Equipment & Materials Manufacturing	11	24,830
67	**The Boeing Co.** Mike Hallman, President, Computer Services	Aerospace	10	24,820
68	**J.P. Morgan & Co.*** Ralph Mastrangelo, Senior VP	Banking	7	24,810
69	**Caterpillar, Inc.** Dale L. Fieldcamp, Manager	Industrial & Automotive Products	3	24,795
70	**Borg-Warner Corp.*** Steve Derry, Director	Industrial & Automotive Products	4	24,760
71	**Shawmut National Corp.** William C. Schrader, Senior VP	Banking	8	24,725
72	**Dover Corp.*** Marty McGowan, Manager	Industrial & Automotive Products	5	24,710
73	**The Goodyear Tire & Rubber Co.*** Jim Evans, Manager	Equipment & Materials Manufacturing	12	24,675
74	**Signet Banking Corp.*** Floyd Griggs, Senior VP	Banking	9	24,670
75	**Black & Decker Corp.** Sid Diamond, VP	Industrial & Automotive Products	6	24,590

* Estimates are from *Computerworld* sources, not the company



Estimated IS budget (millions)	IS budget as % of revenue	Estimated IS value (millions)	IS value as % of revenue	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals as % of employees
$107	3.42%	$60	1.91%	43%	4%	4,063	24.48%
$50	2.14%	$22	0.93%	45%	5%	5,960	29.80%
$17	1.20%	$17	1.20%	40%	2%	6,122	57.48%
$34	1.96%	$21	1.20%	35%	5%	9,102	44.84%
$220	1.44%	$113	0.74%	34%	5%	83,000	44.74%
$60	1.99%	$34	1.14%	35%	5%	18,000	60.20%
$150	2.53%	$100	1.68%	40%	3%	5,000	15.82%
$50	1.12%	$130	2.91%	60%	5%	5,000	24.04%
$25	1.20%	$25	1.20%	43%	7%	6,322	57.48%
$670	1.39%	$180	0.37%	30%	2%	36,600	53.12%
$250	1.18%	$135	0.64%	40%	5%	25,000	49.90%
$116	2.14%	$60	1.11%	41%	3%	14,412	28.54%
$43	1.53%	$8	0.29%	38%	4%	4,165	23.66%
$35	1.60%	$2	0.10%	49%	2%	4,430	63.29%
$29	1.20%	$29	1.20%	40%	2%	15,519	57.48%
$16	1.20%	$16	1.20%	40%	2%	3,851	57.48%
$1,000	5.90%	$100	0.59%	42%	2%	72,500	49.22%
$345	4.40%	$111	1.42%	42%	3%	2,904	18.74%
$200	1.95%	$200	1.95%	40%	5%	12,000	20.69%
$73	2.28%	$40	1.23%	50%	4%	13,822	19.69%
$128	4.56%	$15	0.52%	41%	0.4%	6,000	47.62%
$44	2.24%	$22	1.14%	35%	5%	12,711	66.90%
$140	1.30%	$125	1.16%	43%	5%	22,000	19.26%
$55	4.40%	$18	1.42%	42%	4%	1,105	18.74%
$125	5.27%	$20	0.84%	35%	5%	4,500	22.17%



The 100 Most Effective Users of Information Systems

Overall rank	Company IS executive	Industry	Industry rank	Total score
76	**Bethlehem Steel Corp.** George T. Fugere, VP	Equipment & Materials Manufacturing	13	24,570
77	**Freeport-McMoran, Inc.** Ron Landry, Director	Chemicals	3	24,455
78	**Boise Cascade Corp.** Richard D. Elwood, Director	Equipment & Materials Manufacturing	14	24,450
79	**General Signal Corp.** Stefan Gladyszewski, Director	Equipment & Materials Manufacturing	15	24,435
80	**Warner Communications, Inc.*** Greg Sanchez, Director	Consumer Products	7	24,425
81	**National City Corp.*** Harold B. Todd, Executive VP	Banking	10	24,410
82	**USAir Group*** Bill Ryder, Director	Transportation	4	24,380
83	**Midlantic Banks, Inc.*** Jeff Griffie, Executive VP	Banking	11	24,291
84	**Keycorp** Robert L. Tucker, Site Manager	Banking	12	24,290
85	**U.S. Bancorp** William Ulrich, Director	Banking	13	24,285
86	**Entergy Corp.** Robert Deloach, VP	Utilities	9	24,265
87	**Yellow Freight Systems*** Robert Callahan, VP	Transportation	5	24,240
88	**Schering-Plough Corp.*** Roy Wittman, Director	Pharmaceuticals & Food	7	24,180
89	**Fleet/Norstar Financial*** Michael Zucchini, CIO	Financial Services & Insurance	7	24,155
90	**Corning, Inc.** Harvey Shrednick, VP	Equipment & Materials Manufacturing	16	24,145
91	**Mack Trucks, Inc.** John B. Curcio, VP	Industrial & Automotive Products	7	24,135
92	**Citicorp*** Alan Paderewski, VP	Banking	14	24,105
93	**Martin Marietta Corp.*** James Ritter, Director	Aerospace	11	24,060
94	**Duke Power Co.** George E. Stubbins, VP	Utilities	10	24,005
95	**Du Pont Co.** Raymond E. Cairns, VP	Chemicals	4	23,965
96	**ITT*** Timothy O'Leary, Director	Utilities	11	23,936
97	**Great Western Financial Corp.** Joe Jackson, Senior VP	Banking	15	23,935
98	**NCNB Corp.** Harrison Giles, Executive VP	Banking	16	23,920
99	**First Union Corp.*** Charles Klapheke, VP	Banking	17	23,900
100	**Mellon Bank Corp.** George P. DiNardo, Executive VP	Banking	18	23,825

* Estimates are from *Computerworld* sources, not the company



Estimated IS budget (millions)	IS budget as % of revenue	Estimated IS value (millions)	IS value as % of revenue	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals as % of employees
$87	1.58%	$25	0.46%	40%	1%	7,021	21.34%
$28	1.46%	$14	0.73%	35%	5%	1,050	15.67%
$80	1.94%	$13	0.32%	36%	2%	4,500	22.50%
$50	2.84%	$40	2.27%	25%	2%	8,500	44.50%
$90	2.14%	$28	0.67%	43%	5%	3,995	28.54%
$98	4.40%	$32	1.42%	35%	5%	2,642	18.74%
$228	4.00%	$40	0.70%	35%	5%	25,114	53.55%
$81	4.40%	$26	1.42%	35%	5%	1,986	18.74%
$67	4.81%	$8	0.56%	42%	1%	4,738	45.12%
$61	4.40%	$20	1.42%	53%	0.2%	7,500	79.79%
$82	2.29%	$32	0.90%	37%	3%	5,000	37.31%
$81	4.00%	$14	0.70%	45%	5%	14,565	53.55%
$36	1.20%	$81	2.72%	40%	3%	5,856	26.50%
$104	3.42%	$26	0.86%	42%	4%	4,694	24.58%
$30	1.41%	$20	0.94%	46%	3%	6,750	26.06%
$40	1.90%	$26	1.23%	36%	1%	2,500	26.60%
$1,500	4.68%	$400	1.25%	38%	5%	25,000	27.93%
$100	1.75%	$60	1.05%	40%	2%	10,000	14.53%
$68	1.89%	$38	1.05%	35%	3%	7,548	37.55%
$1,000	3.08%	$140	0.43%	42%	4%	30,000	21.35%
$662	3.42%	$166	0.86%	37%	4%	29,008	24.48%
$100	3.16%	$28	0.87%	30%	3%	18,000	148.76%
$106	3.75%	$24	0.85%	33%	2%	10,900	85.83%
$120	4.14%	$14	0.48%	18%	1%	8,000	40.00%
$172	5.26%	$46	1.41%	48%	2%	11,000	66.67%

MCI Wins Marketing Game With 'Expert' IS Strategy

By Amy Bernstein

MCI Communications Corp., the scrappy underdog of telecommunications, is finally operating in the black after nearly 20 years of negative cash flow. In this year's second quarter, the second largest long-distance phone company boosted revenue 31% from the previous year and more than doubled its earnings.

With a reputation on Wall Street as a savvy marketer, MCI can attribute much of its success to its information systems. The company's ability to match technology and business objectives sets it at the top of this year's *Computerworld Premier 100* and as number one in its industry. In the highly competitive telecommunications field, where the big players are leveraging the same technical guns, how a company manages its technology is more important than the specific hardware and software it uses.



Katherine Lambert

MCI's Ditchfield *leads the utilities pack*

"MCI's strength is not technical know-how so much as knowing how to utilize the technology that's available in network design and configuration. They're very good at applying technology," says Joseph Bellace, an analyst at Merrill Lynch Research in New York.

New applications that MCI's IS organization developed recently include expert systems for the sales force and a real-time order entry system for account managers.

The approach is to centralize, refine and localize new systems. First, build on a mainframe and distribute nationally so users can experiment and provide feedback. Next, refine and port them to personal computers and laptops so users can share the same information everywhere. The process takes time, concedes Allan Ditchfield, MCI's senior vice-president of MIS, but it is a good way to validate prototypes and then put truly useful new tools into the field.

One new product is the Commercial Prospect Advisor, a PC-based expert system that provides salespeople with information on prospective customers. A sales representative can learn, for example, how much a prospect is spending on long-distance services, the chief contact there and details about the business. The system is also useful for qualifying new prospects; one can ask a question such as, "Who in my ZIP code spends $3,000 per month on telecommunications?" Much of the data comes from reports from external information services.

"This data previously took days to accumulate, during which time new business could be lost," Ditchfield says. "Now our salespeople can 'grab and go.'"

KEEPING CURRENT

Another new tool is Pricer, just piloted in the Midwest, which helps salespeople quickly compose accurate pricing proposals for prospects. With tariff rates changing almost daily and differing from state to state, salespeople are hard-pressed to provide accurate quotes. Pricer provides current tariff rates on-line and allows salespeople to play out what-if scenarios on configurations for services such as T1 lines.

The system centralizes the data once contained in several different pricing tools, such as printed tariff books. The advantage to the expert system format is that pricing models can be updated simply by changing

the rule base rather than by rewriting code.

On the billing side, Netcap (Network Capability) is a new real-time order entry system that lets customers sign up for toll-free 800 service almost instantly. Previously, a customer would speak by telephone to an order entry clerk who would shunt the order into a queue to await fulfillment.

MCI's instruction book for setting up the accounts spans 22 pages; it typically took two days to structure an order. Now, however, order entry is integrated with the network so that a new service is ready within 10 minutes of the initial phone call.

Billing is a customer-sensitive component of a broader and more complex issue: giving large telecommunications users greater control of their voice and data traffic as it moves through common carriers.

NETWORKED RESPONSE

MCI is attempting to respond with Integrated Network Management Services, a family of technologies and applications that will let customers monitor, analyze and control their MCI voice and data traffic from a single computer terminal by using Netview, IBM's network management system.

In a company as driven by technology as MCI — it plans to spend $900 million this year to upgrade its communications systems — IS plays a critical role. But the corporate culture is also an important factor in new product development.

MCI's culture encourages frequent and open communication among all employees — an approach that prompted management consultant Tom Peters to brand the company "18,000 crazies."

The Commercial Prospect Advisor was born when division managers told Ditchfield during a weekly video conference that they needed help distributing more information to the sales force, which was suffering from a research backlog.

An integral part of MCI's brainstorming culture is its own electronic mail network; employees love to talk to one another. In fact, MCI's successful facsimile service, launched late last year, began as an E-mail query from Chairman William McGowan to the IS department and became a viable product a scant six months later.

BREAKFAST BRAINSTORMING

Within the IS department, "Doughnuts with Ditchfield" brings together a dozen staff members periodically to discuss anything about the business. Elsewhere, when good ideas arise, Ditchfield is quick to offer cash on the spot — $1,000 to one employee who wrote a new budget system on his own initiative — or to reallocate a staff member to a hot new project.

The long-distance communications business is a marketing game at heart. The differentiating factor among competing firms is how successfully they give customers the products and services in demand.

As MCI strengthens its balance sheet and evolves a technology infrastructure that accommodates rapid enhancements to its network, there is every chance that the company will head into the 1990s and even beyond as a formidable player.

BERNSTEIN IS PROPRIETOR OF GAVROCHE ASSOCIATES, A COMMUNICATIONS CONSULTING FIRM IN BALTIMORE.

Utilities

COMPANIES ARE RANKED BY INDUSTRY ACCORDING TO CW 100 INDEX.
*ESTIMATES ARE FROM *COMPUTERWORLD* SOURCES, NOT THE COMPANY.

Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**MCI Communications Corp.** Arlington, VA 15,900	1	29,835	$5,137	$356	$285
2	**GTE Corp.** Stamford, CT 160,000	2	29,295	$16,460	$1,225	$750
3	**Contel Corp.*** Atlanta, GA 22,200	9	28,030	$2,964	$276	$150
4	**Bell Atlantic Corp.** Arlington, VA 81,000	14	27,565	$10,880	$1,317	$635
5	**Southwestern Bell Corp.** St. Louis, MO 66,000	21	26,850	$8,453	$1,060	$366
6	**AT&T*** Warren, NJ 303,600	23	26,720	$35,210	($1,669)	$600
7	**Northeast Utilities** Hartford, CT 9,200	28	26,405	$2,079	$234	$71
8	**US West** Englewood, CO 69,100	30	26,300	$9,221	$1,132	$250
9	**Entergy Corp.** New Orleans, LA 13,400	86	24,265	$3,565	$411	$82
10	**Duke Power Co.** Charlotte, NC 20,100	94	24,005	$3,627	$448	$68

TRANSPORTATION

IS Services Keep Airline Aloft Despite AMR's New Competition

By David A. Ludlum

American Airlines enjoys an advantage that many chief executive officers would give anything to possess. But owning the most successful computerized reservation service poses some unique challenges: How do you top what you've already accomplished?

The problem takes on a new dimension in light of AMR Corp.'s five-year plan, which envisions American's parent company expanding by two-thirds — from 75,000 employees today to 120,000 by 1994.

AMR's information systems investment totals $1.2 billion, which is nearly 14% of its revenue — a large amount for any company. That ratio, in addition to other criteria, places American at the top of the transportation industry and second place overall in this year's *Computerworld Premier 100*.

"Clearly, if you look at whose traffic is growing the most rapidly, it is the airlines that have reservation systems, and American is swamping everyone," says John Pincavage, an airline industry analyst at securities firm Paine Webber, Inc. In June, the most recent month for which figures are available, American had the largest share of U.S. airline traffic, at 21.8%.

American dropped a plan with Delta Air Lines to merge its reservation systems after the U.S. Justice Department threatened to block the deal, citing threats to competition in both the reservation and airline businesses.



Stan Wolenski

AMR's Hopper *pilots three-pronged information systems strategy*

STEP IN TIME

Earlier this year, American installed a new manager with no information systems experience to head its internal IS organization with the mandate of harnessing the organization to AMR's five-year plan.

Thomas J. Kiernan, the new president of American's Sabre Computer Services Division, brings extensive airline experience to the internal IS organization. With 21 years of service, he has been at American longer than any other top manager, working in finance, administration, marketing, planning and operations. He also was president of an AMR subsidiary that provides ground support services to other airlines.

"I'm trying to make sure the plan we put in place here is in lockstep with the rest of the company," Kiernan says of his new assignment. "I am trying to address some management issues in terms of how we're structured, how we relate to our customers, how we measure our performance, how we hold folks accountable, how we motivate people, recruit people, pay people."

Kiernan's organization is part of a three-pronged IS strategy at AMR. His Sabre Computer Services Division provides support for American Airlines, whose ticket sales generated 85% of the parent company's total revenue of $8.8 billion last year.

The second prong is the Sabre Travel Information Network. Also a division of American, it sells reservations, ticketing and other travel-

related information services and software to travel agencies, corporate travel managers and individuals.

With Sabre facing an increasingly saturated domestic market and stiffened competition from rival services owned by combinations of airlines, the profits it generates for AMR have seesawed, as has growth in its revenue.

Last year, Sabre generated operating earnings of $134 million, 17% of AMR's total and $17 million less than the previous year's $151 million. The Sabre network brought in revenue of $495 million, 6% of the AMR total and 10% more than the $450 million for 1987.

The third thrust of AMR's information technology strategy is AMR Information Services, Inc. A subsidiary separate from the airline, it consists of seven business units that sell information services to other airlines, hotel and car-rental companies, freight shippers and telemarketers and provide technical training and data entry services.



Stan Wolenski

American's Kiernan *will line up info systems behind the business plan*

OVERSEEING THREE

Max D. Hopper, AMR's senior vice-president of IS, holds sway over the three thrusts of the information technology strategy. Hopper has the same title at American that he has at AMR, overseeing both Kiernan's internal IS organization and the Sabre Travel Information Network run by Kathleen M. Misunas. He is also vice-chairman of AMR Information Services, supervising its president, Russell J. Harrison.

These days, Hopper's priorities are to support the airline and knit its systems more closely together with the external Sabre network. "Just trying to find ways to stay even with our [projected] growth is a major challenge," Hopper says.

Hopper contends that both domestic and global revenue growth still lie ahead for Sabre, predicting the network will add more than 1,000 travel agency clients this year, an increase of about 8%. "We'll add at least that much in terms of volume of traffic and revenue," he says. "It's true that in the domestic market, we have to take it away from our competitors now, which is tougher to do. But with a reasonable economy and our worldwide expansion, we think there's still some strength in the old dog yet.

> ***"If you look at whose traffic is growing the most rapidly, it is the airlines that have reservation systems, and American is swamping everyone."***
>
> **— John Pincavage**
> **Paine Webber**

"I like my position a lot better than I would like being any of my competitors," Hopper says.

To continue its growth, American is installing Interact, a $150 million network of personal computers for communications and office automation to be rolled out over five years. The system is aimed at giving workers access to business data and manuals that are difficult to get at today. It will also allow them to use their PCs to exchange forms and documents.

"We believe it will empower a lot more folks to do their jobs better, ultimately producing better levels of service for our customers, and that's kind of the name of the game," Kiernan says.

In another undertaking, American's top management recently approved a plan to consolidate Sabre with the internal network currently in place and the existing portion of Interact's communication links, forming a unified packet-switched backbone.

At the same time, Hopper is considering breaking out parts of Sabre, perhaps running them in separate operating environments. The leading candidate is the system for pricing flights, which involves a small database but consumes a big chunk of the number-crunching power of the Sabre network's eight dual-processor IBM 3090 Model 200Es.

This summer, American began building a "decision data store" — a collection of both internal and external information commonly used in making decisions. As with Interact, the idea is to avoid the need for digging out data manually.

For example, Kiernan says, the data store may allow analysts to compare profits for one of American's

routes with a competitor's flight while considering American's baggage handling and reliability on the route.

"We might be able to draw together diverse pieces of information into a single analysis very quickly," Kiernan says. "That way, we can find out where our problems are rather than just know we have one."

PROFIT PRESSURE COOKER

Over at Sabre Travel Information Network, profits have come under pressure from aggressive marketing of rival systems that in recent years have shifted to ownership by groups of airlines. Texas Air's System One supports Eastern Airlines and Continental Airlines; Programmed Airline Reservation System, or PARS, is jointly owned by Trans World Airlines and Northwest Airlines; Apollo is controlled by the Covia Corp. partners — United Airlines, USAir and four European carriers.

Sabre and its competitors are granting travel agencies discounts as never before, and Sabre rivals are offering to pay legal bills for agencies seeking to escape Sabre's restrictive five-year contracts.

"What we've seen is that the margin has declined as the number of agencies getting discounts has increased," Hopper says. "What we've done is maintained profit levels, although [profit as a percent of revenue] has declined somewhat."

With its competitors, Sabre is looking abroad for rapid growth. In Europe, however, two airline consortiums are building rival systems as Sabre braves it alone on the outside. Covia is a partner in Europe's Galileo consortium, and IBM has subcontracted software work for the Amadeus consortium to System One.

"We believe Interact will empower a lot more folks to do their jobs better, ultimately producing better levels of service for our customers, and that's kind of the name of the game."

— Thomas J. Kiernan
American Airlines

Earlier this year, AMR convinced Europe's national airlines to let Sabre issue their tickets, a prerequisite for conducting significant business in their home countries.

Also, European regulators recently issued rules reasonably accommodating to reservations services controlled by one airline, Hopper says. But he concedes that Sabre probably cannot equal the market share of the European national carriers in their home countries.

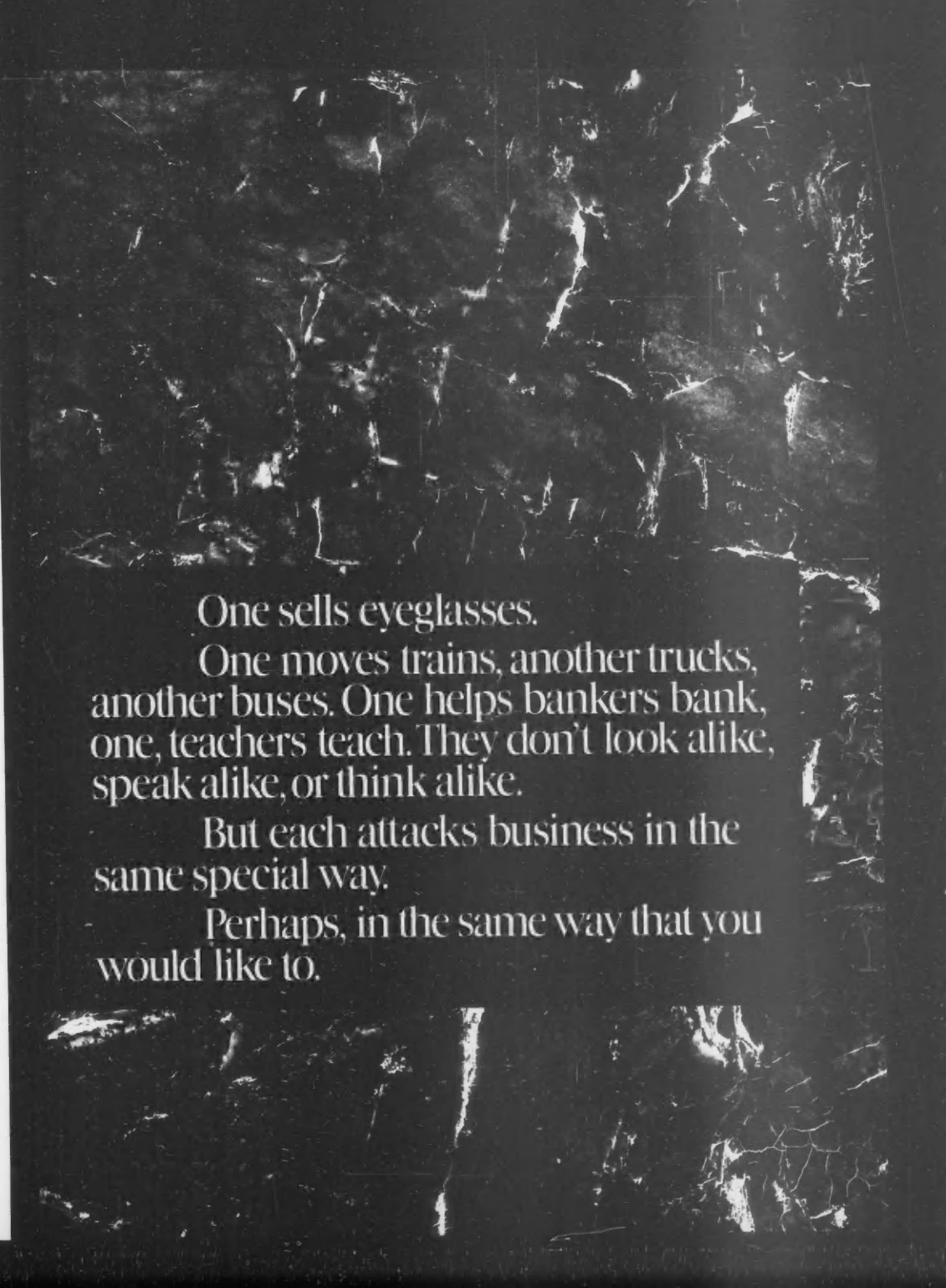
AMR has teamed up with Qantas Airways to install Sabre in Australia. It has forged a link between Sabre and the All Nippon Airways reservation system and is exploring possible relationships with Japan Airlines. "Right now, I think it's safe to say Sabre is being marketed aggressively in Australia," Hopper says. "In Japan, it's being used, but we have chosen not to market directly as yet. We would rather try to find a way to do that in partnership."

LUDLUM IS A *COMPUTERWORLD* SENIOR WRITER.

Transportation

COMPANIES ARE RANKED BY INDUSTRY ACCORDING TO CW 100 INDEX.
*ESTIMATES ARE FROM *COMPUTERWORLD* SOURCES, NOT THE COMPANY.

Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**AMR Corp.** Dallas, TX 67,900	3	29,020	$8,824	$477	$1,225
2	**American President Cos.** Oakland, CA 4,200	11	27,820	$2,131	$81	$110
3	**Federal Express Corp.** Memphis, TN 48,600	46	25,540	$4,244	$210	$200
4	**USAir Group*** Washington, D.C. 46,900	82	24,380	$5,707	$165	$228
5	**Yellow Freight Systems*** Overland Park, KY 27,200	87	24,240	$2,016	$69	$81
6	**The Greyhound Corp.*** Phoenix, AZ 37,200	101	23,805	$3,305	$93	$74
7	**Union Pacific Corp.** St. Louis, MO 47,300	108	23,650	$6,068	$644	$300
8	**United Air Lines** Chicago, IL 66,000	160	22,700	$8,982	$1,124	$300
9	**Roadway Services, Inc.*** Akron, OH 29,500	161	22,600	$2,185	$80	$87
10	**The Hertz Corp.** New York, NY 4,200	168	22,420	$2,131	$81	$110

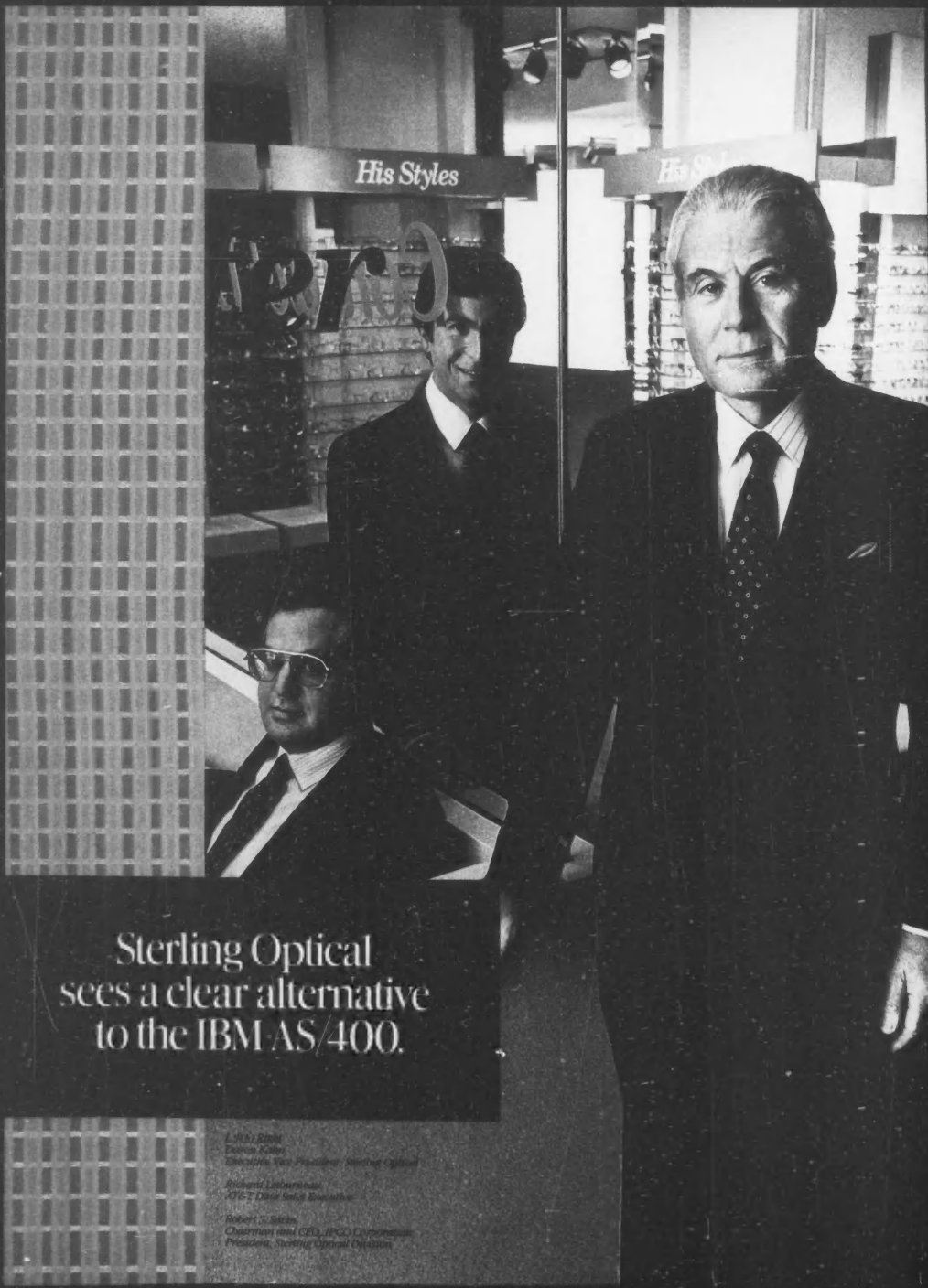


One sells eyeglasses.

One moves trains, another trucks, another buses. One helps bankers bank, one, teachers teach. They don't look alike, speak alike, or think alike.

But each attacks business in the same special way.

Perhaps, in the same way that you would like to.



Sterling Optical sees a clear alternative to the IBM AS/400.

L to R: Rich
Darren Kahn
Executive Vice President, Sterling Optical

Richard Lamoureux
AT&T Data Sales Executive

Robert S. Rubin
Chairman and CEO, IPCO Corporation
President, Sterling Optical Division

Chesterfield, Missouri
February 28, 1989

Sterling Optical, one of the leading optical chains in the country, was looking for a way to get a jump on their competitors in the retail eyeglass and eyecare marketplace. Sterling Optical's Bob Savin, Daron Kahn and AT&T's Rich Letourneau discuss how AT&T developed an open systems-based, retail point-of-sale system to network their 250 stores nationwide.

Sterling: We were getting frustrated by the delays we were facing with the old way of doing things. Our customers were unhappy, we were unhappy, and headquarters wasn't able to keep up with the volume of requests. We knew a highly integrated distributed networked computing solution was the only way to go.

AT&T: And you wanted to preserve the investments you'd already made in applications software—especially those on the System/38.

Sterling: Absolutely. All our RPG-coded customer records and our inventory control system are stored in the database at headquarters. The retail business is demanding—you can't afford to wait to implement brand-new technology. Plus, we don't have a very large computer programming department, and in order to develop, modify, or change corporate programs on the System/38, it's a big effort, and it takes a lot of time.

AT&T: That's why we built our multiuser platform based on the UNIX® System V operating system. We gave you the tools to develop new applications and get them into the mainstream of your business quickly.

Sterling: It made sense. We were able to keep our hardware and software *and* install AT&T 6386 WorkGroup Systems in our stores. Now, on a daily basis, we know what's selling and what's not. We even included an employee time and attendance system that feeds into our existing payroll system.

AT&T: And you've kept your system options open. You can modify any part of the system at any time. Like when you added the automatic pricing software.

Sterling: Right. I think what we like most about the system is its simplicity. Despite the complexity of the information handled, it really gives us easy access to our information. We need that to improve the profit potential of our business, and to maintain our lead in the industry.

AT&T: The system also provides investment protection for what you have today, and a gradual growth path to what you'll need tomorrow.

Sterling: One of the most striking things was AT&T's commitment to service. We came from an environment where it wasn't uncommon to be down for two to three or four days, waiting for equipment to be shipped or repaired.

AT&T: Our message was simple: AT&T wants your business.

Sterling: You were here working as much as we were. And you really listened to us. Of all the vendors we spoke to, you gave us the best proposal, the best equipment, and the best price. In fact, we're so excited about the new system, we wrote it up in our company newsletter.

AT&T: I heard! Can we get a copy?

Sterling: Sure. The only catch is, you have to read it from across the room with one eye closed.

The Sterling Optical Computer Solution:

THE CHALLENGE

Create a point-of-sale computer system specific to the optical retail business for the 250-store nationwide Sterling Optical chain.

THE SOLUTION

AT&T created a UNIX System V-based network of AT&T 6386 WorkGroup Systems and AT&T 605 terminals chain-wide. At headquarters, an AT&T 3B2/500 gathers orders and information from each store daily. The system allows a smooth link between the 3B2/500 computer and the existing IBM System/38. A custom INFORMIX database management system forms the heart of the applications software.

THE RESULT

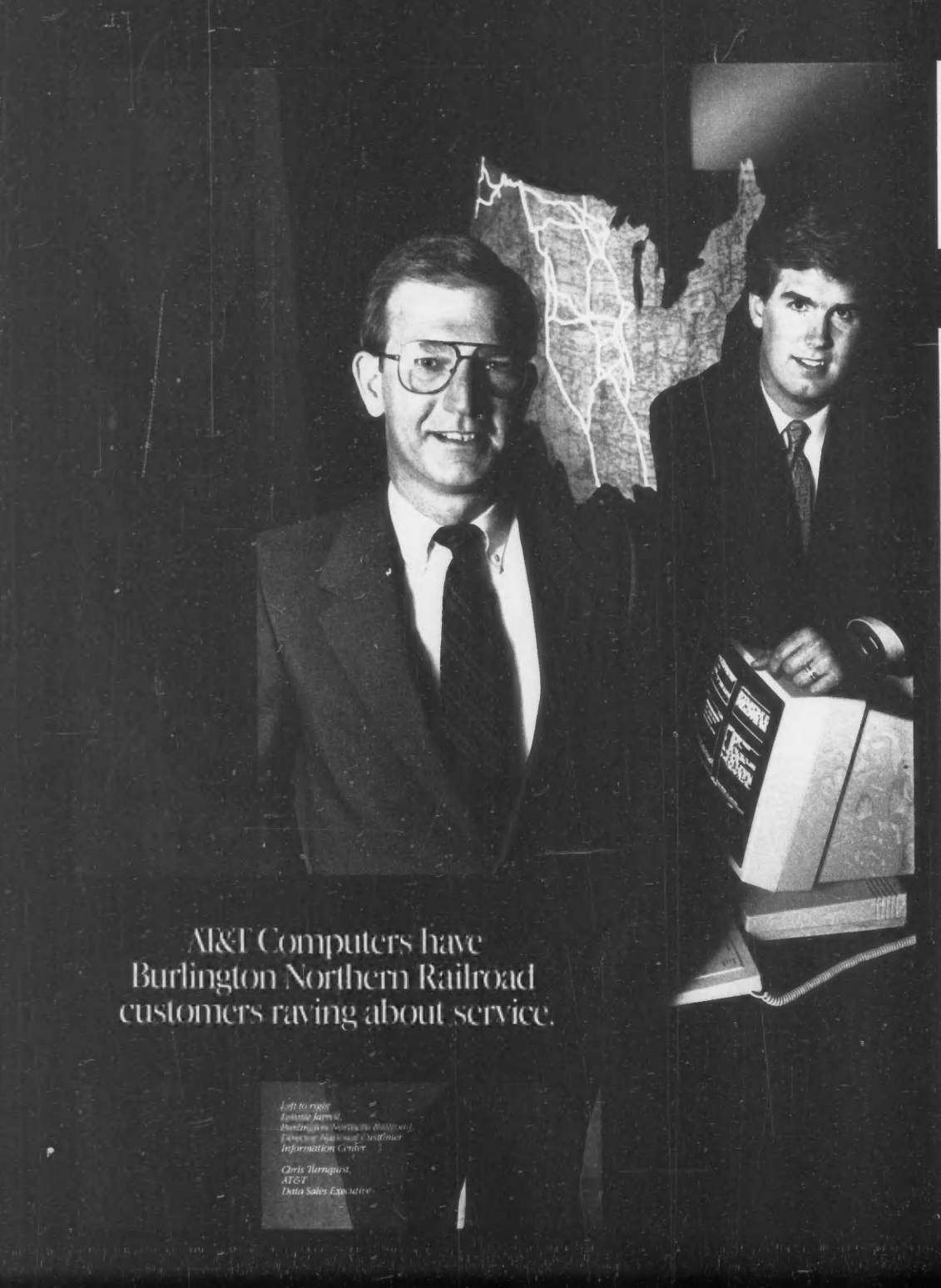
Sterling Optical customers are getting better service. All store locations will be using one standard point-of-sale system that provides increased productivity, a friendlier working environment, and greatly enhances Sterling Optical's competitiveness in the industry.

Call your AT&T Account Executive, AT&T Authorized Reseller, or 1-800-247-1212, Ext. 530.

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AT&T
Computer Systems



AT&T Computers have
Burlington Northern Railroad
customers raving about service.

Left to right:
Lyntina Jarrett,
Burlington Northern Railroad
Director, Business Customer
Information Center

Chris Turnquist,
AT&T
Data Sales Executive

Denver, Colorado
May 2, 1989

The Burlington Northern National TrackSmart® Center is getting rave reviews from its customers. And AT&T's distributed networked computer solution behind it is getting rave reviews from Burlington Northern. Burlington Northern's Lonnie Jarrell tells AT&T's Chris Turnquist why AT&T Computers provide a better way to serve customers of the longest railroad in the country.

Lonnie: We want to be known for superior customer service. So we planned proactive shipment monitoring through a new customer service concept—the National TrackSmart Center.

Chris: And better customer service means getting information to your customers, in *their* reporting format, as soon as your reps have it.

Lonnie: Exactly. All we had to do was listen to our customers to understand their transportation information needs. That was plenty of inspiration. We knew then that we needed a system that would let our reps instantly locate cars and report shipment status to customers immediately.

Chris: I remember when your reps could only handle one customer at a time. They had to query the mainframe database car by car. And *then* manually record their findings and send them out. Now each rep can handle up to ten customers, right?

Lonnie: Absolutely, plus the rep has more time to serve his customers better. Now they save time by tracking every car from *one* CRT. The AT&T 6500 Multifunction Communications System gives them multi-window access to two synchronous sessions on our host, as well as async access to the TrackSmart application and AT&T Mail. Both TrackSmart and AT&T Mail run concurrently on the AT&T 3B2/1000 Computer. So the reps get information the second they need it.

Chris: And you're able to tap information easily.

Lonnie: Right. Because you molded AT&T distributed networked computing to fit the Burlington Northern, rather than the other way around. You provide it all—computer networking systems and communications expertise. Plus you blend it all together with other systems better than any company I've ever seen.

Chris: I understand one customer wrote a BN rep promising him an official company ID naming him their Assistant Transportation Manager.

Lonnie: That's true. But you know, if we're going to be a partner to our customers, we have to be a partner with vendors who can take us in that direction.

The Burlington Northern Computer Solution

THE CHALLENGE

Differentiate Burlington Northern as a superior provider of customer service.

THE SOLUTION

A distributed networked computer solution integrating Burlington Northern's applications with a UNIX® System V-based Informix® 4GL database management package. An AT&T 3B2/1000 Computer is the gateway to the host for TrackSmart information. The AT&T 6500 Multifunction Communications System provides host access with four window functions appearing on AT&T 6539 displays. AT&T Mail sets up an E-mail link between reps and customers. AT&T Mail with Private Message Exchange/TERM is a private E-mail link between Burlington Northern reps and TrackSmart.

THE RESULTS

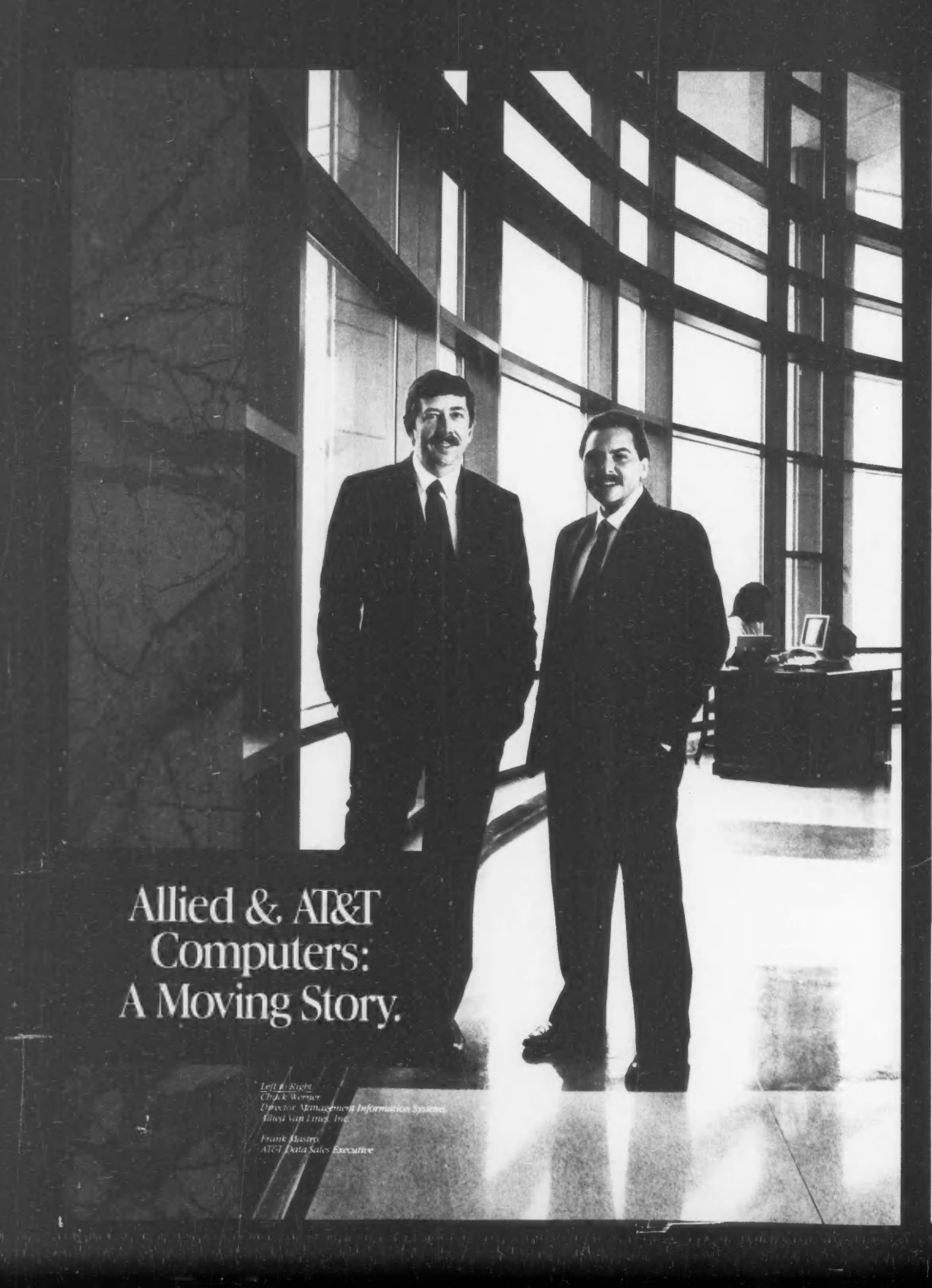
The system increases the number of customers a representative services tenfold. Some customers have indicated TrackSmart saves them at least four hours daily.

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AT&T Computer Systems


Allied &. AT&T
Computers:
A Moving Story.
Left to Right
Chuck Werner
Director, Management Information Systems
Allied Van Lines, Inc.
Frank Bustro
AT&T Data Sales Executive

Chicago, Illinois
February 23, 1989

Recently, Allied® Van Lines tied their corporate computer systems into one fast, efficient, distributed computer network. Allied's Chuck Werner tells AT&T's Frank Mastro how AT&T's Distributed Network solution saved money for Allied and improved agent service.

Frank: You guys are pretty tough customers.

Chuck: (Laughs) You bet! There were a lot of frustrated folks here; some managers had to use six terminals to get complete answers about billing, tariffs, etc. We'd seen the power of distributed networked computing when you linked Purchasing's AT&T 3B2 computers to Accounting's IBM host. We wanted more, and we wanted it fast.

Frank: Many companies are trying to manage multi-vendor systems and applications, but yours were particularly complicated.

Chuck: Believe it or not, we were running accounting on the IBM 3090, claims insurance on the Qantel, tariffs on the DEC PDP, and claims checking on the Wang.

Frank: None of the computers could talk to each other. People really needed six terminals to answer some questions.

Chuck: We had to have true distributed processing, and AT&T was the proven choice. You have a technical edge with the Information Systems Network. Because ISN allows transparent access to *all* our different systems, we could replace six terminals with one AT&T 605.

Frank: Now a claim or bill is just a hot key away.

Chuck: Plus ISN saved us money when we moved to our new data center. We didn't have to rewrite applications; we just moved everything we already had, and plugged into the ISNs through voice wiring paths. No one believed it—true investment protection!

Frank: I'll never forget *that* weekend.

Chuck: We now respond to 95% of our agents' questions in three seconds. And we're seeing cost savings already. AT&T 605 terminals each cost less than six months' rent on the old IBM terminals. We'll save a half-million dollars in expenses this year alone.

Frank: Plus everything runs over AT&T fiber-optic cable and twisted-pair wiring in your new building, instead of coax; you saved there, too.

Chuck: Right. We're delighted distributed networking customers of AT&T. We've had 3B2 computers in the field for years, handling shipment registration and accounting for agents. Your solutions are elegant: that's why your RFP won this time, over five other vendors. You know how to make our agents happy, and when they're happy, we're happy.

The Allied Computer Solution:

THE CHALLENGE

Create a cost-effective, distributed network for Allied. Link mainframes and minicomputers into an efficient network. Streamline agent operations; quicken their response time.

THE SOLUTION

A custom campus network system. AT&T Information Systems Starlink (ISN) and AT&T 605 terminals interconnect Allied's different hosts. AT&T 3B2 computers help agents track shipments, and provide host connectivity. AT&T Premises Distribution System (PDS) provides fiber-optic and twisted-pair distribution media.

THE RESULTS

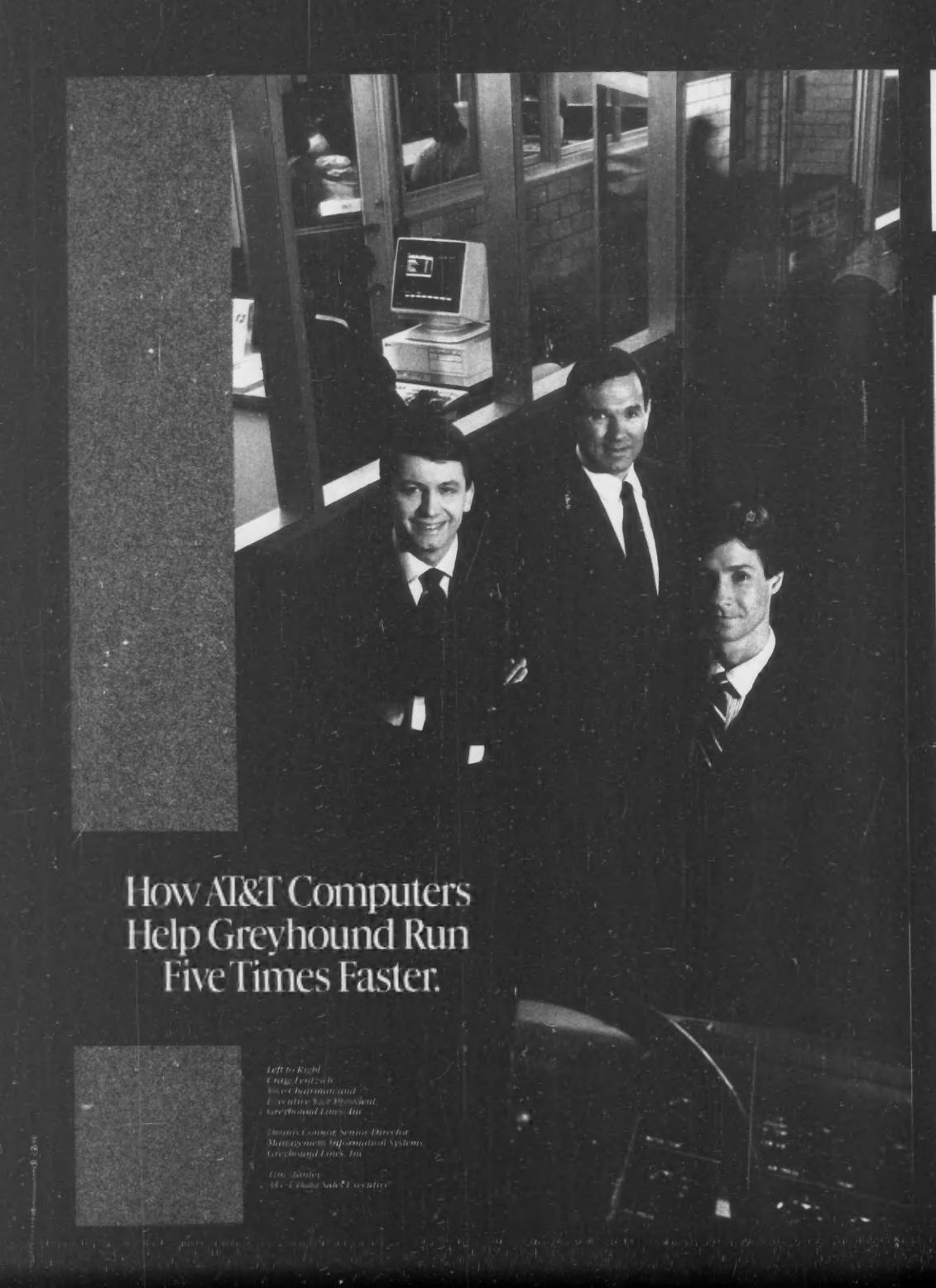
A distributed networked computing solution serving Allied's more than 500 remote agents and their worldwide customers efficiently. Major cost savings on equipment and overhead. Significant agent productivity and service. An open environment for expansion into ISDN.

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AT&T
Computer Systems



How AT&T Computers Help Greyhound Run Five Times Faster.

Left to Right
Craig Lentzsch
Board Chairman and
Executive Vice President,
Greyhound Lines, Inc.

Dennis Connor, Senior Director
Management Information Systems,
Greyhound Lines, Inc.

Eric Ainley
AT&T Data Systems Sales Executive

Dallas, Texas -
March 1, 1989

Tim: The first time we met, you had an ambitious plan to completely automate your scheduling and ticketing operation. I was astonished at its complexity. You have 165,000 combinations of fares that a customer could ask for.

Craig: Ticketing automation was part of our master plan to remake Greyhound from the ground up. You can see why.

Dennis: Our old ticketing system wasn't good enough. We had trouble with volume and updating the point-of-sale terminals. Frequently the agents would have to thumb through thick manuals to get fare and schedule data.

Craig: It took three or more minutes to issue a ticket, which was not acceptable. You helped us design our ticketing solution based on AT&T WorkGroup System computers.

Tim: And today you have happier customers!

Dennis: Ticketing is five times faster. Customers tell us they get faster service in bus stations than airports. These lines *move*.

Craig: Since we can't afford downtime, your top-to-bottom commitment to supporting the total solution sold us on AT&T. We saw you as a partner for computer solutions, not a PC vendor. Anyone can sell PCs or minis.

Dennis: You were the only computer company with a nationwide service network and the willingness to respond to us on demand.

Craig: We won't stop with passenger ticketing. Distributed computer networking is our leverage to improve package express service in a major way.

Dennis: We are tying our networks together. Whether it's packages or people, it's one screen.

Tim: And the distributed solution includes the bus scheduling system running on both your Tandem computer in Omaha and the IBM mainframe in Des Moines.

Craig: The AT&T system is open. And it has growth capabilities, so that when we see an opportunity, we can take it. I'm very proud of what we've done. As our motto says, "the bus is back."

The Greyhound Computer Solution:

THE CHALLENGE

Create a cost-effective, reliable, point-of-sale ticketing and scheduling solution for Greyhound nationwide ticketing agents in transportation centers.

THE SOLUTION

A PC workgroup solution including AT&T 6300 and 6312 WorkGroup Systems and Model 570 printers throughout the nationwide Greyhound agent system.

THE RESULTS

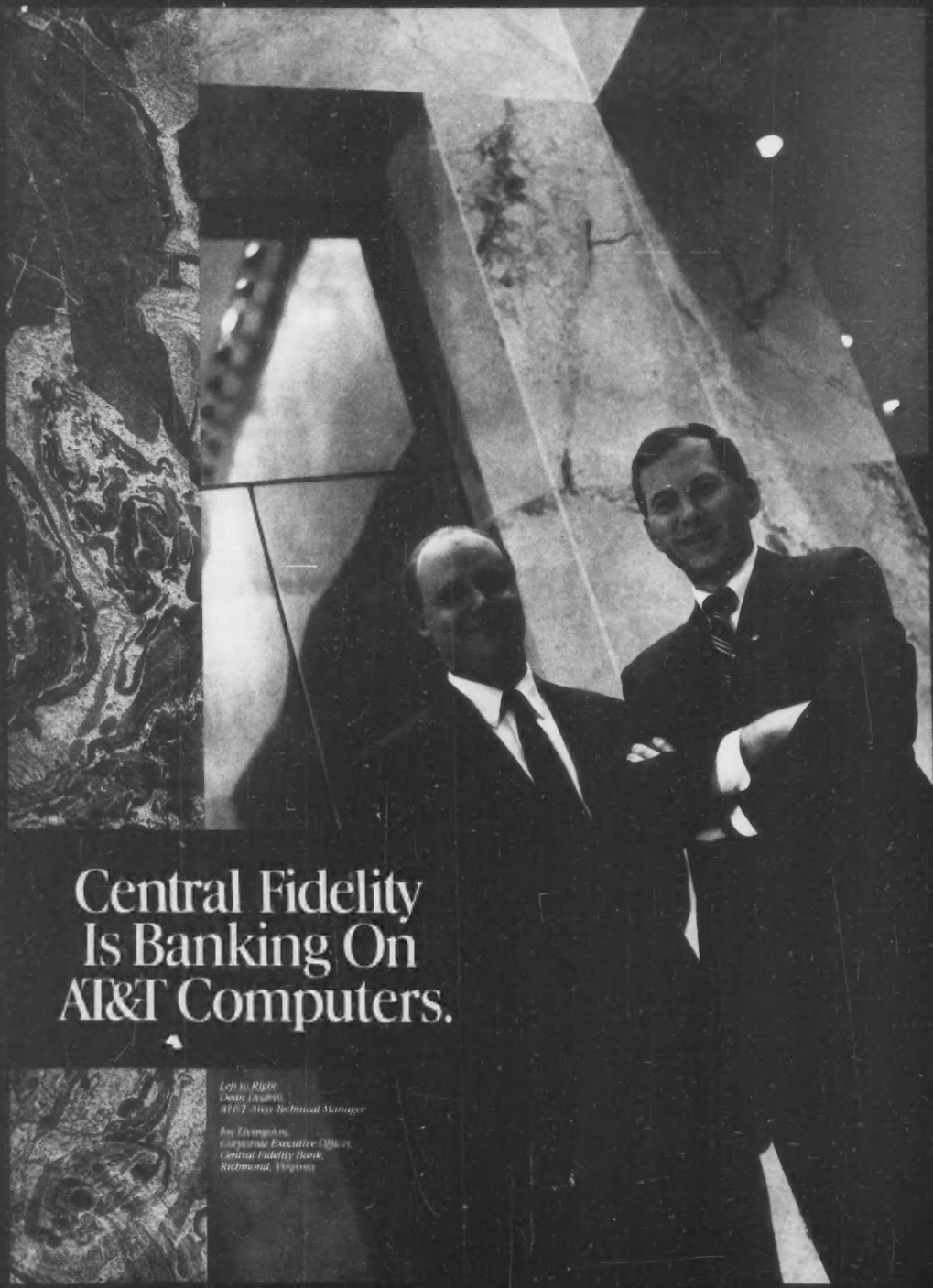
Ticketing is five times faster. And the system is a key to the future integration of all Greyhound computer networks handling routing, fare changes, package express, maintenance and data communications.

Learn more. Call your AT&T Account Executive, AT&T Authorized Reseller, or 1 800 247-1212, Ext. 532.

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AT&T Computer Systems



Central Fidelity Is Banking On AT&T Computers.

Left to Right
Dean Lindsay,
AT&T Area Technical Manager

Jay Livingston,
Executive Executive Officer,
Central Fidelity Bank,
Richmond, Virginia

Richmond, Virginia
February 2, 1989

Central Fidelity Bank is among the nation's top 100 commercial banks with $4.8 billion in assets. Looking to extend its fourteen-year record earnings streak, the bank commissioned its data processing division to deliver a vital strategic initiative, improve productivity, enhance sales opportunities, and provide faster customer service in the bank's nearly two hundred branch offices. Jay Livingston met recently with Dean Dodrill of AT&T to review their work together.

Jay: Service is what bank customers expect. Faster service improves customer satisfaction and leads to more profitable relationships. When you speed up service, everyone is more productive, and we can spend more time with customers selling the bank's financial products.

Dean: Service and selling both depend on information. Our challenge was to provide the branches with rapid access to customer information and present that information to branch personnel in the most meaningful way. This could only be accomplished with a distributed, networked computing approach.

Jay: That's right. Our first priority was service and sales support in our branches, which meant fast, accurate retrieval and dispersal of information was crucial. AT&T's banking architecture provided that.

Dean: Early on, you talked about cost-effectiveness, return on investment, and a strategy for future growth and functionality. Remember that?

Jay: With an emphasis on profitability. We had major investments in existing systems and a lot of branches. AT&T's open systems approach didn't require trade-offs or expensive host additions, which is one of the reasons you got the business. AT&T's creative alternatives surprised us.

Dean: The ease of networking AT&T WGS computers was fundamental to our proposal. We delivered maximum functionality, flexibility, and reliability to every workstation in each branch.

Jay: And StarLAN was a terrific way to connect and share branch resources. You made the most of our assets, including the intangible ones.

Dean: Like your customer databases—we found ways to further develop relationships with existing customers. The applications development tools we built saved time for your developers. New products and services can now be added quickly to both platform and teller software, so service and sales can continually improve.

Jay: Every bank employee associated with this system has become more productive. In my twenty-three years of banking, I've never seen a vendor provide such high-quality service and support. Central Fidelity Bank and AT&T are well positioned for the future.

The Central Fidelity Computer Solution:

THE CHALLENGE

Build a distributed, networked computing solution that would improve productivity, customer service, and sales.

THE SOLUTION

The AT&T Retail Banking Solution: An integrated systems solution that provides effective bank branch platform and teller automation. Supported by AT&T WorkGroup Systems, AT&T StarLAN, and software provided by Online Financial Communications Systems, Inc. And AT&T Application Foundation, developed by AT&T Bell Laboratories, provides a highly productive software customization environment.

THE RESULTS

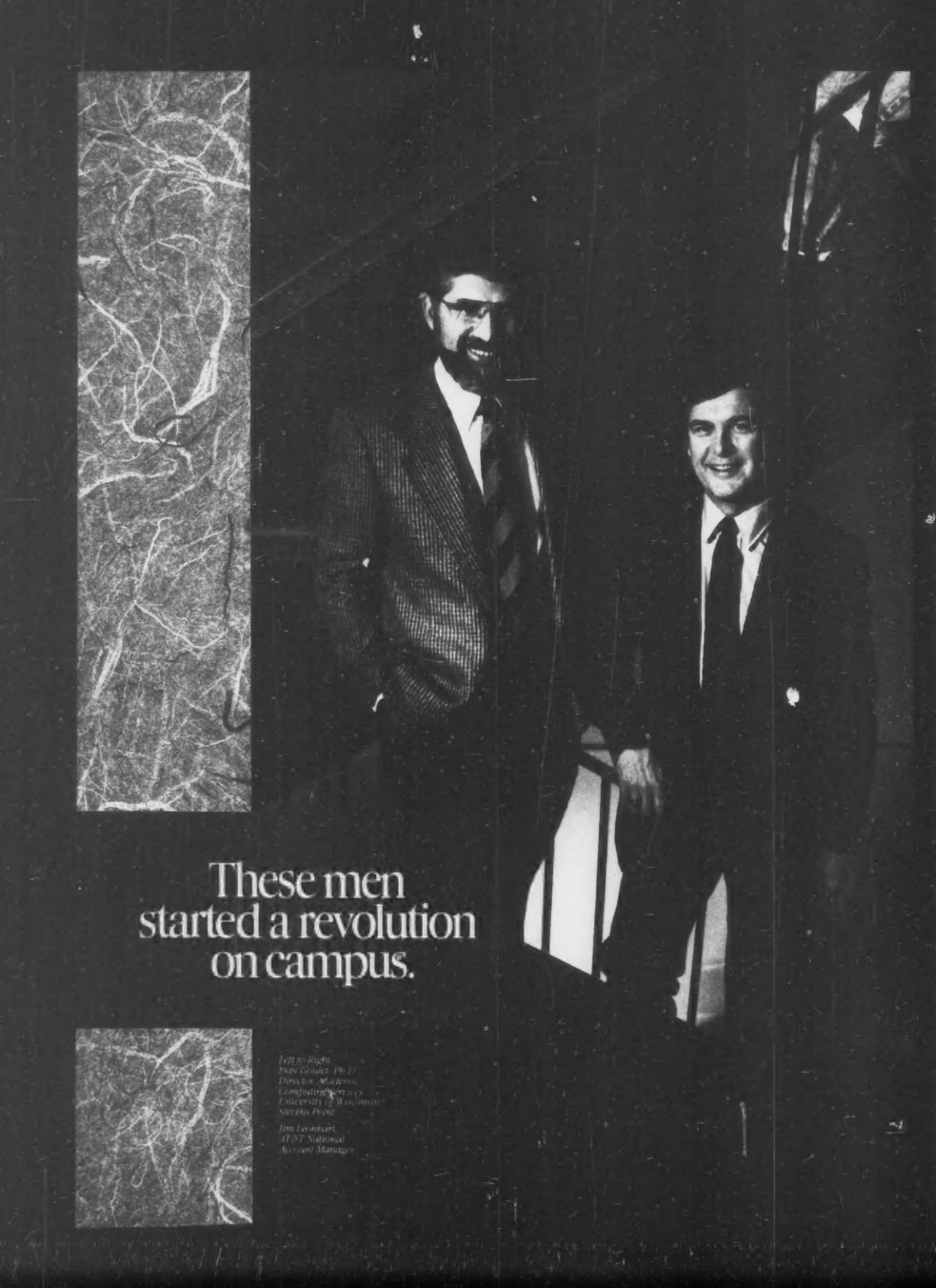
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AT&T
Computer Systems



These men started a revolution on campus.

Left to Right
Don Gouker, Ph.D.
Director, Academic Computing Services
University of Wisconsin-Stevens Point

Jim Leonhart,
AT&T National Account Manager

University of Wisconsin
January 22, 1989

Recently, an information management revolution occurred at the University of Wisconsin–Stevens Point. Dan Goulet from the University and Jim Leonhart of AT&T—campus radicals of a different kind—explain how they were able to realize a bold and complex vision.

Jim: I remember the first day we met. You had been around the block a few times, but weren't getting the answers you needed.

Dan: We wanted to create a unique education environment: a free-flowing on-line computer campus. We had a vision, and we were looking for someone to help build it.

Jim: A distributed networked computing solution, that's what we'd call it now: a way to process, move and manage information effectively, throughout a widespread organization.

Dan: We talked to many computer vendors before you. We got tired of describing what we needed, so we drew it. That graphic was about 13 feet long.

Jim: More like twenty. The chart showed every information resource on campus linked together, accessible to students, faculty, and administration. It became the wallpaper in my office for fifteen months.

Dan: It was like a blueprint for a data superhighway.

Jim: We put our ISN wide-area network at the center—like an interchange—and built fiber and twisted-pair data lanes to applications running on AT&T 3B2s, DEC, UNISYS and other hosts located in all the departments. We put on- and off-ramps in strategic locations: StarLAN networks that gave access to the highway from workstations.

Dan: We designed everything from the user perspective. The more technically remarkable the system became, the harder we worked to make it approachable.

Jim: Easy for novices, powerful enough for programming students.

Dan: We developed a menu-driven user interface that is consistent and clear. Students and faculty can select applications like checking spelling, transmitting course grades, even browsing through the on-line card catalog of 1.5 million books at the University of Wisconsin–Madison. We wanted desktop power and access, but we wanted to process information where it made the most sense.

Jim: Thinking back, we realized early that the complexity of your vision precluded a single-system focus. You needed open systems.

Dan: You were really the only ones that understood this point. Open systems allow us to use off-the-shelf components; vendors have to bid against each other to get our business. Open systems are the secret.

Jim: It's mind-boggling how much computer power is out there. We wanted to harness it all, yet give a piece to every individual.

Dan: A truly distributed network, one we don't think we'll ever outgrow. We've added 300 WGS workstations in the last five months.

Jim: Dan, where in the world is that wallpaper today?

Dan: We had it bronzed. Today, so many colleges and businesses really need a similar solution. That's probably why we've had so many visits from them lately.

Jim: Little did we know back then, when we first met.

Dan: Oh, something tells me you had a hint.

The Stevens Point Computer Solution:

THE CHALLENGE

Create a distributed computing revolution, link the campus into an integrated information resource open to every user.

THE SOLUTION

AT&T 3B2 computers support a multitude of UNIX* System V-based applications. AT&T StarLAN connects AT&T WGS computers, a variety of micros, and hosts together. The AT&T Information Systems Network (ISN) is every campus user's gateway to all computer resources.

THE RESULT

Stevens Point has been designated a Center of Excellence for Distributed Academic Computing by the Board of Regents for the entire University of Wisconsin system. The majority of the 9000 students on campus regularly use the network for coursework and homework. Faculty have integrated computing into 41% of their coursework.

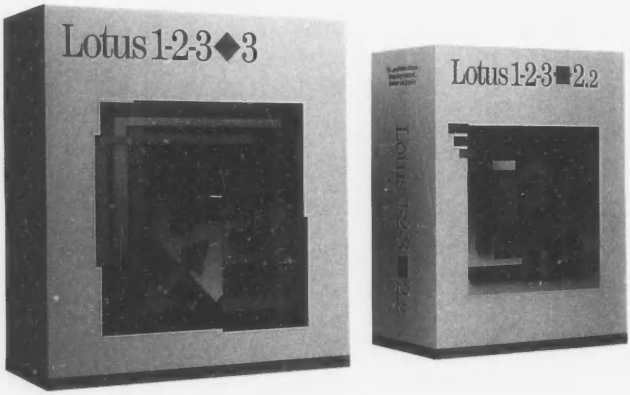
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The new Lotus 1-2-3 family is here, with impressive power and versatility. But if you manage many corporate upgrades, you still face delays with the upgrade process.

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That's why Corporate Software created the Lotus Upgrade Management Program, the best way for large corporations to manage Lotus upgrades.

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Andy Freeberg

Vona, executive vice-president, *sees technology as "an integral part of the fabric"*

Bankers Trust: One Step Ahead Through Decentralizing

By Suzanne Weixel

Four years ago, Bankers Trust New York Corp. stole a march on its competitors in the banking industry by restructuring its information systems to support newly developed self-managed profit centers.

Now, as other banks awaken to the value of flexible, independent units, Bankers Trust is poised to reap the benefits of moving first.

The change has radically transformed the bank from a traditional commercial bank into a powerful trading and merchant institution, says Raphael Soifer, a banking analyst at Brown Brothers Harriman & Co. in New York.

"They were the first of the major banks to break off their operating services into separate businesses, and they started reorganizing their systems early as well," he says. "Other banks are trying it now, but they are running into stumbling blocks. None of the others are quite as well managed as Bankers Trust."

Key to the success of the transition is to have a comprehensive technology architecture that provides a backbone of IS support for the profit centers.

This advanced planning and continued commitment to technology earned Bankers Trust a place at the top of the banking category in this year's *Computerworld Premier 100*, nudging it ahead of last year's leader, Banc One Corp.

The bank's IS restructuring has paid off in the following ways:

- Employee productivity has increased substantially. For example, 80% of all transactions in the bank's global money transfer are accomplished electronically with no staff intervention, according to a report by Salomon Brothers, Inc.

Ten years ago, Bankers Trust processed 4,000 transfers per day with 500 employees. Today, 220 employees process an average of 32,000 transactions per day.

- The bank's funds control system automatically checks that all money transfers meet the internal overdraft limits placed on each user of the system.
- Because the architecture ensures consistent designs regardless of what system is being used, it is possible for users at any one of a half-dozen data centers around the world to sit at a terminal and have real-time, on-line access to any service provided by any data center.

The bank is seeking further productivity improvements by installing fiber-optic communications networks and image processing systems.

WORK AS ONE

Behind the implementation of advanced technology is an understanding that systems must be integrated with the business to be successful.

"We decided right up front that in order for this architecture to work, we had to make technology an integral part of the fabric of our institution," says Carmine Vona, executive vice-president for worldwide technology.

The changes began at Bankers Trust a decade ago, when management — led by then and future chairmen Alfred Brittain III and Charles S. Sanford Jr. — decided that in

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order to remain competitive in the industry, it was necessary to restructure. Over the next few years, however, in an innovative move, the bank sold its retail banking and credit card operations, reorganized its management from a typical bank's hierarchical bureaucracy to more of a horizontal structure and instituted a companywide philosophy of integration and cooperation.

FOLLOWING SUIT

Coincidentally, the Computer Systems Department (CSD) arrived at many of the same decisions concerning the best ways in which to implement technology at Bankers Trust.

In the early 1980s, the CSD had grown to a total of 1,400 employees and was mired in bureaucracy, delivering increasingly flawed applications and becoming more and more alienated from the user community.

Vona, then a division manager within the CSD, saw the trouble brewing. The malaise afflicting the IS organization at Bankers Trust was not unique. "We were experiencing the same level of pain as the average organization," he says. "We just came up with a unique remedy."

The solution: a decentralized, bankwide technical architecture. When Bankers Trust reorganized into independent profit centers, says Vona, it was only natural for the technology to follow suit.

Decentralization was an obvious cure for what troubled the CSD but one laden with side effects. As Vona tells it, the key was figuring out how to solve the problems associated with large centralized groups without falling into the traps posed by small decentralized groups.

Decentralization was an obvious cure for what troubled Bankers Trust's IS but one laden with side effects.

Potential pitfalls of decentralization ranged from a proliferation of technologies, an inability to integrate systems and a duplication of efforts — all of which would lead to skyrocketing costs.

Anticipating the usual battles between business-minded managers and technology developers, Vona built the solution into the architectural plan.

Enlisting the support of top-level management, Vona specified that ultimate control over the types of technology and methodologies used by each business unit would remain in the hands of a small central staff of technology managers. Every expenditure over $10,000, the plan stated, must be approved by the small central group.

It took a year of debate among senior management, CSD management and the user community before his architecture was accepted, but in 1983 Vona was appointed deputy department head and put in charge of the team that would develop the architecture.

Once in place, the architecture guided the bank's technology plans, allowing IS to be a step ahead of the changes in the banking industry rather than simply reacting to them.

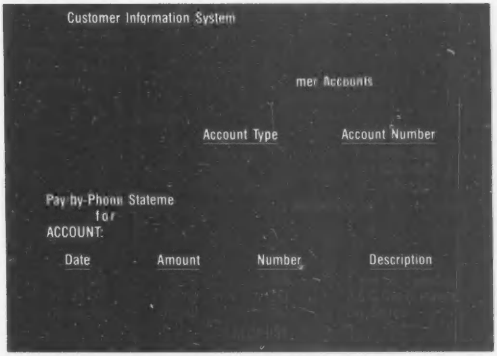
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Banking

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Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**Bankers Trust** New York, NY 12,500	4	28,740	$5,851	$648	$370
2	**Banc One Corp.** Columbus, OH 16,900	5	28,501	$2,735	$340	$170
3	**Security Pacific Corp.** Los Angeles, CA 41,900	7	28,220	$8,483	$639	$440
4	**Norwest Corp.** Minneapolis, MN 15,600	15	27,450	$2,475	$211	$110
5	**Sovran Financial Corp.** Hyattsville, MD 14,400	39	25,820	$2,230	$243	$110
6	**Valley National Corp.** Phoenix, AZ 7,600	45	25,570	$1,147	$62	$53
7	**J.P. Morgan & Co.*** New York, NY 15,500	68	24,810	$7,839	$1,002	$345
8	**Shawmut National Corp.** Boston, MA 12,600	71	24,725	$2,811	$243	$128
9	**Signet Banking Corp.*** Richmond, VA 5,900	74	24,670	$1,239	$153	$55
10	**National City Corp.*** Cleveland, OH 14,100	81	24,410	$2,227	$233	$98

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Circle Reader Service Number 7

Strategy Pays Off in Defense Contracts for General Dynamics

By Connie Winkler

General Dynamics Corp. is doing a good job of staying out of trouble. Unlike its competitors, which are struggling with contracts, cost overruns and uncertain congressional support, the St. Louis-based aerospace company enjoys secure long-term agreements.

"General Dynamics has been very successful at landing a number of programs important enough to be continued at a reasonably high level of production," says Paul H. Nisbet, who follows the industry for Prudential-Bache Securities, Inc. in New York.

Information systems have been vital to the company's success in the manufacture of such products as nuclear submarines, F-16 fighters, M-1 tanks and missiles. For example, the production of the F-16 — which now accounts for about 35% of the company's sales and 50% of earnings — has been highly automated since the 1970s. The jet fighter's development relies heavily on electronic design and manufacturing systems.

"The F-16 is one of the most automated production programs under the Department of Defense," Nisbet says.

The company's commitment to IS caused it to rank first among aerospace companies in this year's *Computerworld Premier 100,* outscoring last year's leader, Northrop Corp., which placed second in the category this year.



R. D. Renken

General Dynamics' IS *group chooses not to rest on its laurels under director Ken Wang, splitting into two parts to address user and corporate needs*

Despite its success, General Dynamics' IS organization is refocusing its efforts from supporting specific company products to what IS Director Ken Wang calls process management. The Data Systems Division (DSD) was split into two new groups 18 months ago — one to work more closely with users and another to provide corporatewide services. The split is aimed at consolidating IS support, reducing costs and developing ways to shorten design and production lead times.

This new emphasis on redesigning processes to meet user needs comes as company officials acknowledge a new U.S. defense climate of reduced government spending, greater scrutiny of contracts by Congress and serious disarmament negotiations with the Soviet Union.

"We used to manage and design the product, whether [they were] weapon systems or information systems," Wang says. "Now our focus is on life-cycle improvements versus lowest cost at the time of the decision. Improvements across General Dynamics are more important than local opportunities."

With an estimated $550 million budget, the Data Systems Division manages centralized IS facilities and works closely with groups running engineering systems within the different business divisions. These days, there is much greater emphasis on coordination among the

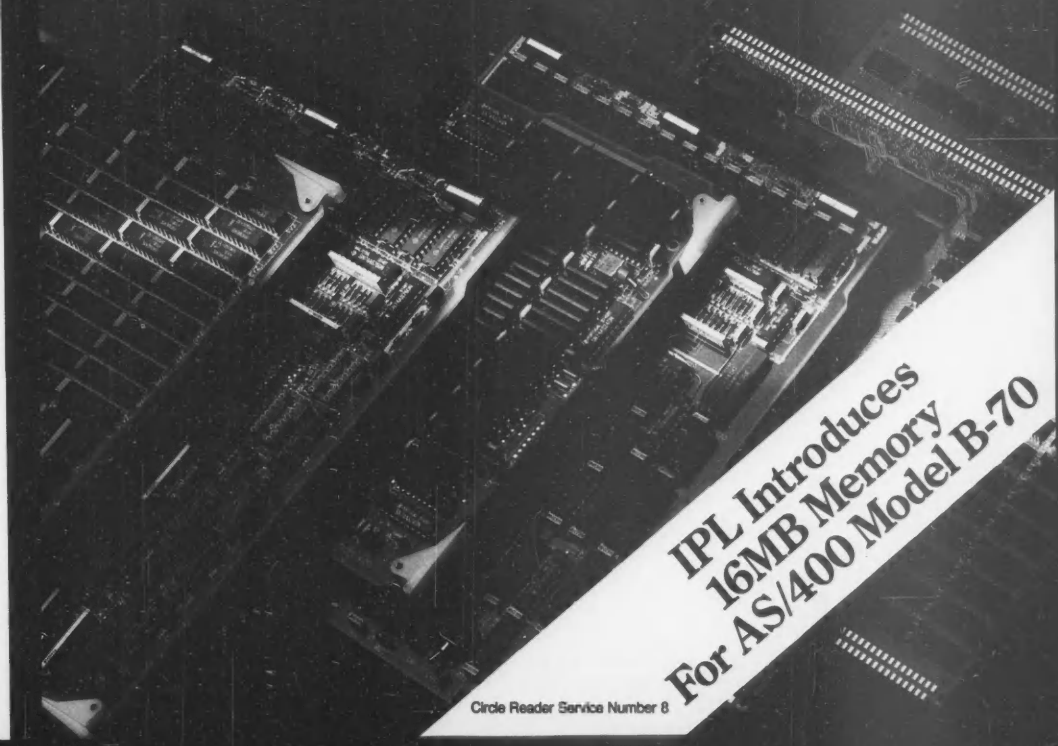
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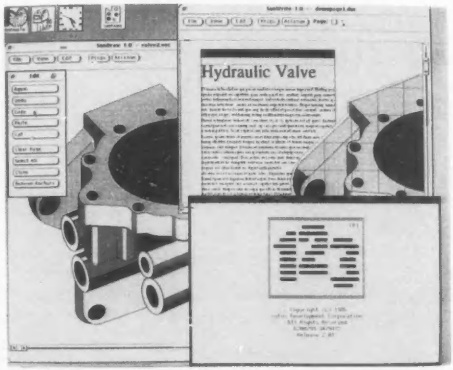
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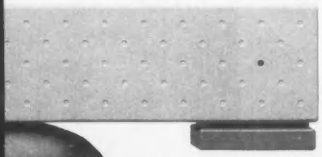
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Circle Reader Service Number 9

various IS groups. In the past, the company had experienced problems with overly autonomous IS operations. The divisional groups might purchase unique hardware or software systems that solved short-term needs but did not connect with other systems or could not be upgraded.

Now the emphasis is on systems connectivity and longer useful life. This approach places more emphasis on managing design databases and design analysis than on specific processors or application packages. It also takes the focus off acquiring the latest technologies.

"We go after state-of-the-market tools as opposed to state of the art," Wang says. "We're a high-tech engineering company, but we're being more conservative, more prudent."

To bolster its drive for flexibility, General Dynamics has embraced a multivendor policy on hardware. "We try to have two competing suppliers," Wang says. "We've made a conscious decision not to put all our eggs in one basket." For example, at the Fort Worth, Texas, data center, where a Cray Research, Inc. X/MP-24 is already running, General Dynamics recently upgraded its phalanx of IBM mainframes with one from Amdahl Corp.

The emphasis on overall connectivity causes a more careful review of make-vs.-buy decisions on software, communications and other IS services. Applications will be written in-house only when there is a clear advantage to the firm, Wang says.

Aerospace

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Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**General Dynamics Corp.** St. Louis, MO 104,100	6	28,500	$9,551	$379	$550
2	**Northrop Corp.** Hawthorne, CA 46,400	12	27,740	$5,797	$104	$380
3	**Gencorp, Inc.*** Akron, OH 14,900	13	27,605	$1,891	$67	$40
4	**Lockheed Corp.** Calabasas, CA 93,100	18	26,985	$10,590	$624	$450
5	**Grumman Corp.** Bethpage, NY 32,900	20	26,880	$3,591	$87	$253
6	**McDonnell Douglas Corp.** St. Louis, MO 116,900	29	26,325	$15,072	$350	$786
7	**United Technologies Corp.** Hartford, CT 188,400	34	26,135	$18,087	$659	$814
8	**Textron, Inc.** Providence, RI 60,500	38	25,865	$7,286	$272	$235
9	**Rockwell Int'l Corp.** Seal Beach, CA 114,200	42	25,650	$12,135	$779	$440
10	**The Boeing Co.** Seattle, WA 147,300	67	24,820	$16,962	$614	$1,000

THE NEXT PHASE

Wang — who had 12 years' experience in General Dynamics' San Diego engineering group before taking on the Data Systems Division management assignment — is managing the acquisition of a new corporatewide data network to replace the current satellite system.

A key to General Dynamics' new strategy, this network will facilitate the more flexible distribution of large amounts of data between locations than is currently allowed by the satellite and expensive earth stations. Wang's staff is evaluating proposals from vendors for the first phase of the network's design and installation. The vendor may be selected by the end of the year, which means that the system would be operational by July 1990. The new system will likely include a backbone of T1 and T3 lines linked via gateways to local-area networks within departments.

"There's nothing wrong with the satellite network, but because of competitive pressures, we have to be able to move more data faster," Wang says.

Day-to-day computer decisions at General Dynamics are made by two groups in consultation: Each division has its own information resource management professionals who plan, analyze and propose needed systems. Arbitrating contention between groups is the Data Systems Division.

The DSD emphasizes training programs for approximately 4,600 employees, keeping a corporate commitment to provide workers with at least 40 hours of training per year. Wang attributes this emphasis on training and employee development to a turnover rate for IS workers that is in the single digits, even in highly competitive regions of the country.

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Circle Reader Service Number 10

Don't Save a Seat: Baxter Healthcare Doesn't Settle for the Leading Edge

By Clinton Wilder

After a conversation with Michael S. Heschel, Baxter Healthcare Corp.'s corporate vice-president of information resources, you may not be sure what year you're living in. Heschel is so future-oriented, aiming at late-1991 implementations of various technologies and the like, that it can be hard for a listener to keep up with him.

That kind of forward vision is absolutely critical when you are part of a company that already has a strong reputation in the effective use of information systems. Baxter, through its 1985 merger with American Hospital Supply Corp. (AHS), acquired the ASAP customer on-line order network, a system perennially cited as a leading example of the use of IS for competitive advantage.



David Kogan

Baxter Healthcare's Heschel *focuses on the future*

But Baxter became the *Computerworld Premier 100's* No. 1 IS user in equipment and materials manufacturing not by sitting on its laurels but by moving ahead. Enhancements to ASAP are only the beginning.

"The real key to Baxter's success is that they've continued to expand and migrate the technology," says Victor Janulaitis, a consultant whose Los Angeles-based firm, Positive Support Review, has worked closely with Baxter. "There are no giant leaps of technology, just gentle nudges to stay ahead of the pack."

Baxter identifies three areas, Heschel says, in which it concentrates information technology efforts:

- Make as much data as possible available throughout the $6.8 billion corporation.
- Implement leading-edge manufacturing technology.
- Push the computing function out into the business units and down to the most feasible functional level.

"We're trying to drive the processing as close to the person making the business decision as we can," Heschel says. "We have to do that to get costs down and reduce product lead time, eliminate layers of bureaucracy that aren't necessary and reassign those people to more productive areas."

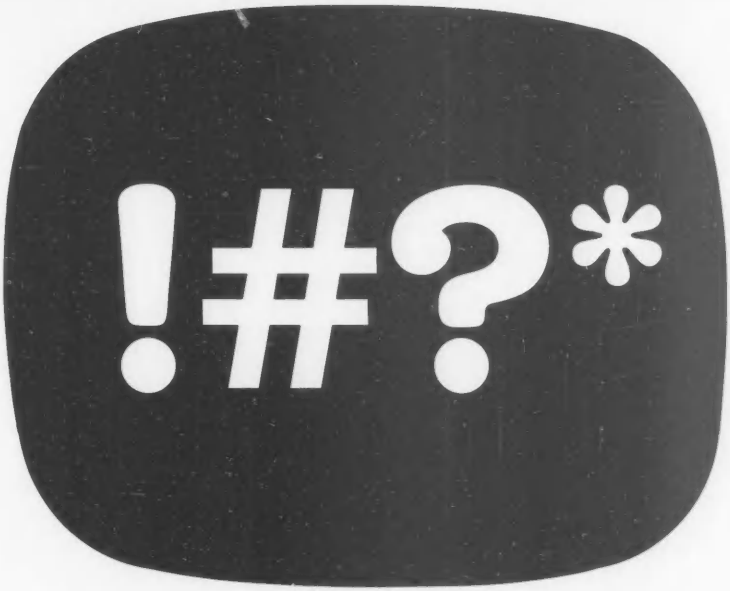
Baxter increased its population of terminals, personal computers and workstations by a whopping 44% in 1989 to 36,000, including 6,000 microcomputer-based systems that replaced terminals.

But the hardware platforms are only the means to an end. Baxter's goal for the first quarter of 1991 is to provide users with a single order processing and distribution system, called Online Express. The Baxter and former AHS operations currently run two different order processing systems. "We want to make Baxter look like one Baxter," Heschel says.

In the competitive medical products industry, time to market is a critical success factor. Observers give Baxter high marks for streamlining that process with technology links among manufacturing, marketing and distribution functions.

"They have the most efficient distribution systems and use it to their advantage," says Jerry Fuller, medical industry analyst at Chicago-based Duff & Phelps, Inc.

As an example, Janulaitis points to the way Baxter can respond to a



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Circle Reader Service Number 11

customer order for a product that is out of stock in the distribution center. A system of search-and-seek rules can find the product at an earlier stage of the manufacturing cycle; then, a manager decides if it is feasible to speed up production.

"They can pull the product off the factory floor, or they'll ship a competitor's product to fill the order," Janulaitis says. "Their business is intricately linked with technology."

To Heschel, however, enough is never enough. ASAP, for example, is in the process of a major facelift, migrating from dumb terminals to Intel Corp. 80286-based PCs. Five hundred of the 7,000 ASAP terminals in hospitals and other customer sites will be switched to PCs by the end of this year. The PCs run ASAP Express, an enhanced application allowing customers to access records of their own purchasing and product-use patterns.

For Baxter's top 100 executives,

Equipment & Materials Manufacturing

COMPANIES ARE RANKED BY INDUSTRY ACCORDING TO CW 100 INDEX.
*ESTIMATES ARE FROM *COMPUTERWORLD* SOURCES, NOT THE COMPANY.

Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**Baxter Healthcare Corp.** Deerfield, IL 62,800	8	28,075	$6,861	$388	$250
2	**3M Co.** St. Paul, MN 82,700	24	26,645	$10,581	$1,154	$517
3	**Great Northern Nekoosa*** Stamford, CT 19,600	40	25,745	$3,588	$347	$43
4	**Nortek, Inc.*** Providence, RI 10,651	53	25,205	$1,425	$20	$17
5	**Becton Dickinson & Co.*** Franklin Lakes, NJ 20,300	54	25,175	$1,749	$165	$34

Powerware is a registered trademark of Exide Electronics.



1959 1969

including Chairman Vernon R. Loucks Jr., the information resources department developed PC Express, a user-friendly application for analyzing the company's financial status. "We used a lot of cycles on the front end to remove 'terminal shock,'" Heschel says.

Heschel attributes much of Baxter's success to continual reassessment of technology and the business. "Once you know who you are and what you want to be when you grow up, you can do a real assessment of IS capabilities," he says.

Baxter's next IS frontier is extensive networking of its overseas operations — which account for about 20% of revenue — with corporate headquarters. That is the kind of long-range plan that Heschel likes.

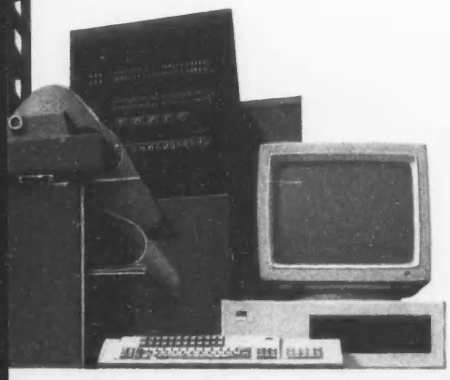
Part of his ability to focus on the future stems from his position as a member of Baxter's operating committee, a corporate status enjoyed by few IS executives. On the committee, long-range IS planning is done side by side with business planning.

"Baxter knows that just because you're a winner today doesn't mean you will be in five years," Janulaitis says. "They're making sure they have something left after Heschel retires and the organization changes."

Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
6	**The Mead Corp.*** Dayton, OH 20,800	58	25,120	$4,464	$353	$50
7	**Temple-Inland, Inc.*** Diboll, TX 11,000	59	25,100	$2,099	$199	$25
8	**North Amer. Philips Corp.*** New York, NY 50,500	62	24,966	$5,424	$79	$116
9	**Owens-Corning Fiberglas** Toledo, OH 17,600	63	24,965	$2,831	$197	$43
10	**Burlington Holdings, Inc.** Greensboro, NC 7,000	64	24,890	$2,167	$72	$35

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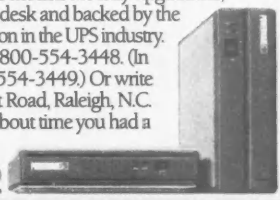


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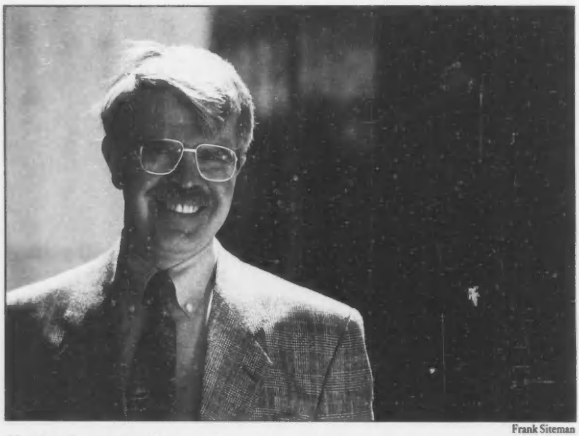
1979 1989

Powerware Personal Series From Exide Electronics

Circle Reader Service Number 12

Gillette Slips Takeover Tries with Razor-Sharp Systems Edge

By Alan Radding



Frank Siteman

Moller joined Gillette *during its new information systems initiatives*

After two close shaves with hostile takeover attempts, Gillette Co. is finally celebrating some good news.

In July, the company announced the selection of Herbert Moller, a career financial executive then with the corporation's Braun AG subsidiary in West Germany, as corporate vice-president and director of information systems.

Moller, who oversaw IS at Braun as its chief financial officer, succeeds Kavin Moody, who left Gillette in June 1988. Professing that he is not an information systems professional, Moller says his role will be "to serve as a link between IS and the line managers."

Moller's arrival coincides with key information systems initiatives that have helped Gillette rank at the top of the consumer products industry in this year's *Computerworld Premier 100*.

IS has been deeply involved in supporting Gillette's new razor product, Flag, which has been the subject of considerable speculation and is expected to be introduced this fall.

The IS group acquired and customized new manufacturing resources planning packages for both the machine shop where the production tools are designed and built and on the factory floor. It has developed additional CAD/CAM applications and dedicated a Digital Equipment Corp. VAX to the project. The new systems will be applied throughout the shaving products division.

Other recent programs include a sales information system, a worldwide electronic mail network, utilization of new market research databases and downsizing of systems from mainframes to personal computer networks.

To support these efforts, Gillette spends $96 million annually, or about 2.7% of its revenue. Another $80 million accounts for the market value of the firm's installed equipment.

The corporate IS department, located in Boston, runs a headquarters data center and manages domestic operations for the three chief product groups — shaving devices, other personal care items and stationery products. The bulk of the information processing is distributed throughout the worldwide organization.

HIGHS AND LOWS

Gillette is bounding back from the dark days of 1986 and '87, when it paid greenmail as it fought off corporate raiders and subsequently cut personnel, including the IS staff, about 8%. Last year, sales rose 13% to $3.6 billion while net income climbed 17% to $268 million.

"Gillette is setting all-time highs," says Harry E. Wells, director of research at securities firm Adams Harkness & Hill in Boston. "The company has come through [the takeover attempts] with flying colors."

One of the reasons for Gillette's current success is the new sales system, which allows managers in the field to quickly access information on customers and the performance of salespeople rather than waiting for the traditional end-of-the-month report.

"The managers wanted to take a more active approach toward information," says Joseph Cloonan, the controller of Gillette's corporate

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32. Programmer, Methods Analyst
35. Dir., Mgr., Suprv., OA/WP
36. Data Comm. Network/Systems Mgt.
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12. Vice President/Asst. VP
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D. Communications Systems
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information systems organization.

A global E-mail system, which was completed this year, runs on General Electric Information Services' public network and supports Gillette's efforts to tie its systems together throughout the world. The network provides any Gillette worker who has access to a PC with the ability to communicate with any other worker, regardless of location, Cloonan says.

The global communication system also lets Gillette users throughout the world access applications anywhere in Gillette systems, Cloonan says. The project got under way in 1988 and will be completed this year.

Although the rocky financial times are apparently over, two obstacles still face Gillette's IS group: It must control decentralized systems, particularly LANs, and continue to work within tight budget constraints.

Gillette also recently acquired a market research database package that enables marketing managers to keep tabs on competitive products. The system provides the managers with better access to and analysis of the voluminous amounts of syndicated data available.

Gillette has taken a pioneering role in moving applications from mainframes to PC-based local-area networks. The company has moved more than 50 applications from large systems to PC-based networks. For example, the IS staff provided a LAN for a central database application containing all account information used by the credit analysis group. The LAN provides "a central point of information on all accounts," Cloonan says.

LANs are a major growth area for Gillette worldwide as well as an important focus for its distributed information resource groups, particularly in manufacturing operations in smaller plants.

LANs offer price/performance advantages over other systems such as IBM's Application System/400, the more conventional replacement for IBM's System/34, 36 and 38 processors, Cloonan says.

HURDLES

Although the rocky financial times are apparently over, two obstacles still face Gillette's IS group: It must control decentralized systems, particularly LANs, and continue to work within tight budget constraints.

"We have to ensure that there is control and integration," Cloonan says. Despite increased corporate profits, budget growth is merely keeping pace with inflation, and "the 1990 budget decisions are even harder than in previous years," he says. "We're being asked for more systems, more applications and more networks."

Gillette's corporate IS group researches new technologies, but tight budgets in recent years have forced it to prioritize its activities and zero in on technologies that promise a relatively swift payback.

For example, the company is

Consumer Products

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1	**Gillette Co.** Boston, MA 29,900	10	27,925	$3,581	$269	$96
2	**Polaroid Corp.** Cambridge, MA 12,300	31	26,285	$1,863	($23)	$61
3	**McGraw-Hill, Inc.*** New York, NY 16,100	36	25,995	$1,818	$186	$125
4	**Macmillan Publishing Co.** New York, NY 9,400	37	25,870	$1,019	$49	$90
5	**Berkshire Hathaway, Inc.*** Omaha, NE 20,000	52	25,305	$2,333	$399	$50
6	**Masco Corp.*** Taylor, MI 27,000	65	24,875	$2,439	$288	$29
7	**Warner Communications*** New York, NY 14,000	80	24,425	$4,206	$423	$90
8	**Eastman Kodak Co.*** Rochester, NY 134,900	112	23,590	$17,034	$1,397	$266
9	**The Leslie Fay Cos.*** Wilkes-Barre, PA 3,500	129	23,295	$683	$22	$8
10	**Mobasco Corp.*** Fairfax, VA 6,424	174	22,310	$791	($18)	$9



David Leifer

Gillette's Cloonan, *controller of corporate information systems*

looking at image processing. "We are studying image processing to see if there is an immediate return on the investment," Cloonan says.

Initial indications are that there are good opportunities but that the technology is still too costly. "It is not like picking up a couple of PS/2s," he adds. Expert systems will remain on the back burner for now, although down the road, Cloonan says they can benefit Gillette.

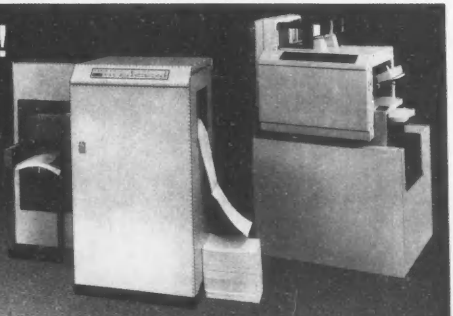
Despite Gillette's financial worries and tight budgets, Moller is confident that the company will continue to invest in systems, although the investments will be selective.

"The company hasn't been shy in investing in areas where it saw a good return for the business lines," he says. "If a business unit or IS generates a sound idea, the company will follow through [with the money]."

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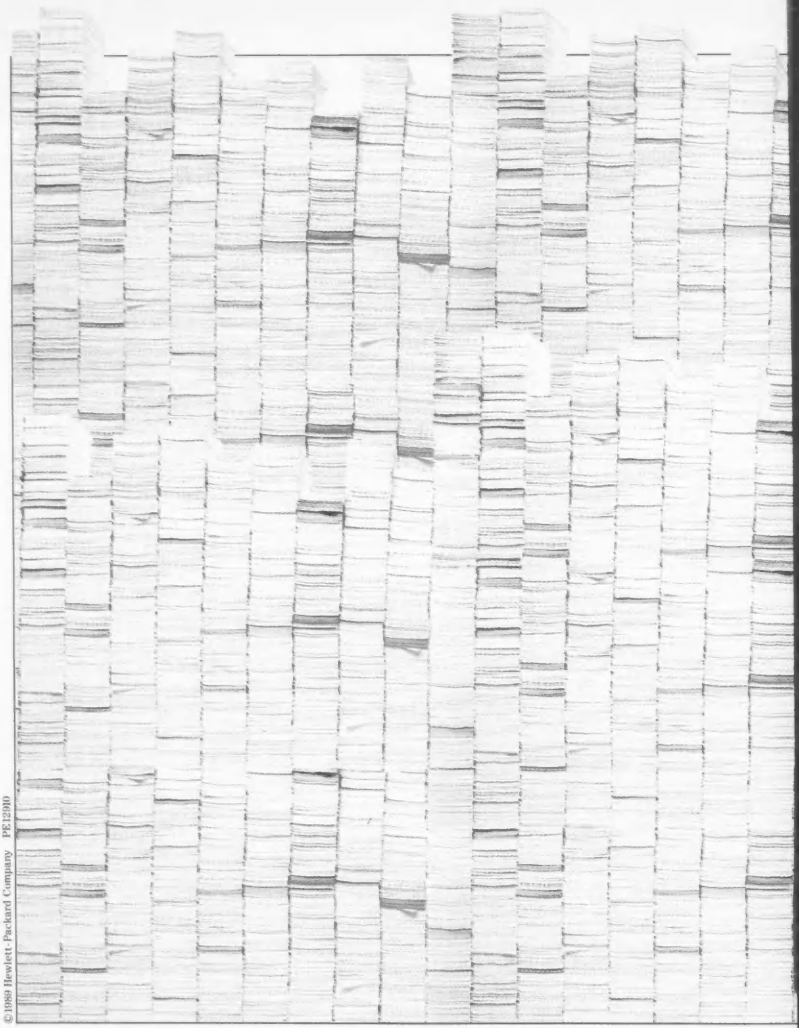
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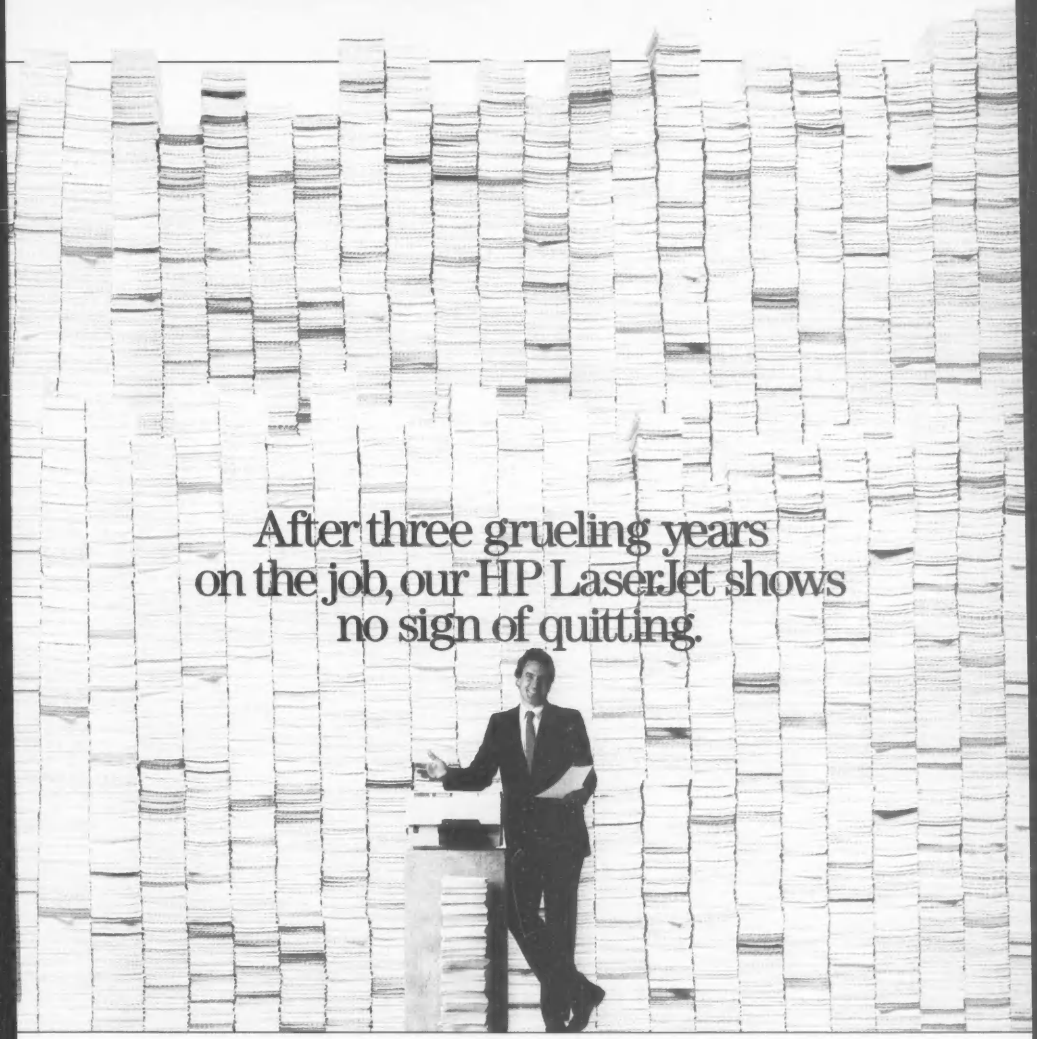


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Unified Business Focus Drives American Express' Diversified Success

By Michael L. Sullivan-Trainor

In the midst of stiff competition in financial services, American Express Co. stands apart. Rather than follow the pack, the company has staked out a clear market focus and applied technology to differentiate itself from other firms.

"American Express charges a premium price to merchants and card members, and they have to justify that through superior customer service. They provide that service through the use of information technology," says Thomas J. Martin, vice-president at Arthur D. Little's Artificial Intelligence Center in Cambridge, Mass.

The company spends an estimated $1 billion annually — more than 4% of revenue — on information systems, yet staff costs are lower than the norm, with only 23% of the IS budget used for personnel. These figures, among others, give American Express its rank of 25th in this year's *Computerworld Premier 100* and No. 1 in its industry category.

By using technology to provide high-quality service, American Express maintains its upscale customer base, which helps it stay healthy when the economy is less robust.

"The company shows signs of being recession-resistant, partly due to its target high-income market," says analyst Stephen Biggar at Argus Research Co. in New York.

American Express' use of technology is driven by two key concepts. Structurally, it combines corporatewide ventures with decentralized business units that operate autonomously. The ventures provide economies of scale, particularly in volume equipment purchases and technology research and development. The second force is the company's dedication to applying advanced technology when there is a clear payoff.

"Our focus in advanced technology — which we define as anything too risky for routine deployment — is to look at projects that are either visible to the customer, such as improving service or offering a new product, or ones that offer very large cost displacements," says Roy Lowrance, vice-president of technology and strategy.

WATCHING OVER

Lowrance manages a corporate-level research and development program and heads a team of nine IS staff members, who act as consultants to IS operations in each of American Express' five business units. Each unit has its own IS executive. In addition to evaluating vendors and technologies, the corporate group organizes quarterly meetings of a Business Unit Systems Executive Committee composed of the units' IS executives.

The five units are Travel Related Services Co. (TRS), IDS Financial Corp., Shearson Lehman Hutton, Inc., American Express Bank Ltd. and a newly formed IS products subsidiary, American Express Information Services Co.

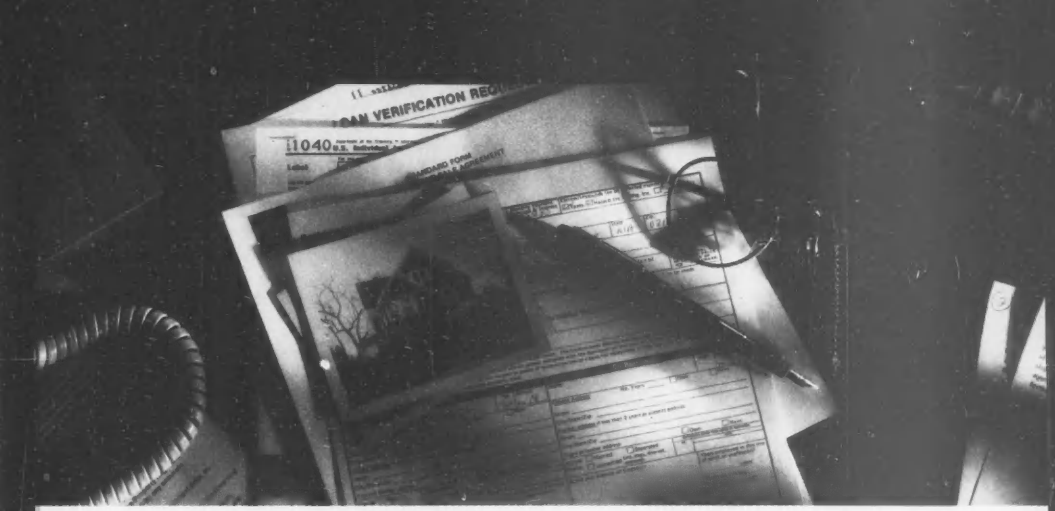
Until recently, American Express President Louis V. Gerstner Jr. was the driving force behind the company's IS strategy, particularly in the advanced technology area. When Gerstner resigned in March to head RJR Nabisco, American Express Chairman and CEO James D. Robinson III took over in the position of acting president.

"When Gerstner left, we all asked the same question: Is it over for technology?" Lowrance says. "But Robinson came in and told us to take everything Gerstner was doing and



John Martini

Cupp's department *helped generate 32% of the firm's $23 billion revenue*



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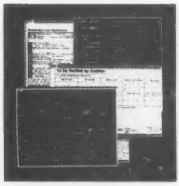
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Circle Reader Service Number 15

double it. He has followed through on that."

The information systems operation for TRS, the largest business unit, is run by Executive Vice-President Garland Cupp. This division, which handles credit-card transactions, was responsible for 32% of the company's $23 billion revenue and earned 70% of its $1.04 billion in profits. Last year, the division processed transactions for 30.7 million credit cards.

Keeping up with the volume is a demanding part of TRS' job. CPU capacity has grown more than 30% per year in the past five years.

To help maintain responsiveness in the credit authorization application, TRS is installing a series of Stratus Computer, Inc. distributed processors throughout its worldwide network.

"Our core system is host-based here in Phoenix, and coupled with our network, it provides good availability. But the name of the game is 100% availability. So we're installing remote processors," says Ken Chrisman, vice-president of architecture, technology and data management at TRS.

The processors will be interlinked with TRS' network and the networks of large service establishments such as hotels and airlines.

TRS' other well-known technology initiatives include an image-processing application designed by TRW, Inc.'s Technicron Financial Services. It generates images of credit receipts for card holders and provides improved service and cost savings for the company.

Another initiative is an expert system called Authorizer's Assistant that helps agents evaluate credit applications, automatically providing account data and recommendations for action.

By using technology to provide high-quality service, American Express maintains its upscale customer base, which helps it stay healthy when the economy is less robust.

TRS is also engaged in an examination of what the company's business and technology needs will be five years from now. This future-oriented business plan, called the Genesis Project, includes further developments on the IS front.

"Part of the project would involve a more than $50 million investment in expert systems to improve customer service," Arthur D. Little's Martin says. "That kind of investment would put them ahead of the other financial services companies in applying expert systems."

The company would not confirm the extent of the Genesis investment in expert systems.

An early by-product of the Genesis effort is the spin-off of TRS' Data Base Services Group into its own company and the fifth business unit — American Express Information Services Co. The new company will sell IS products, including telemarketing services in a joint venture with AT&T.

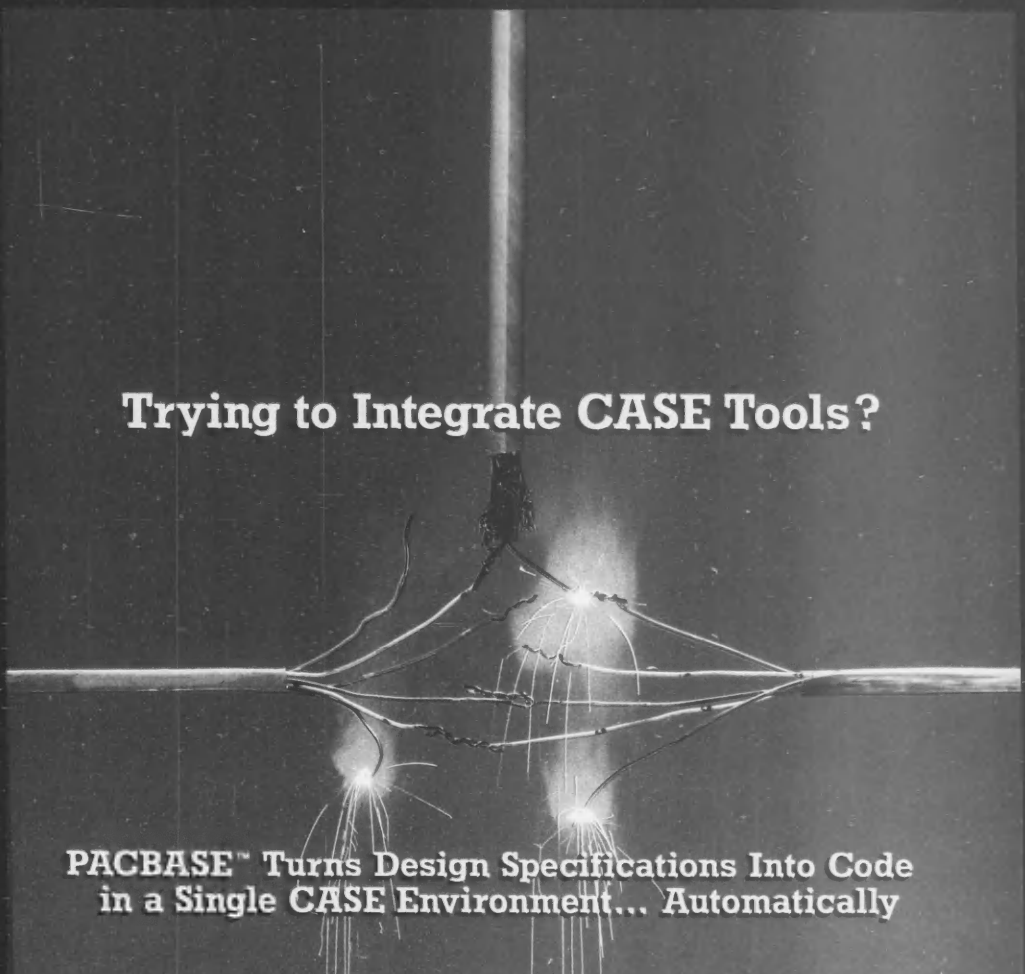
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1	**American Express Co.** New York, NY 92,200	25	26,610	$22,934	$1,039	$1,000
2	**Farmers Group, Inc.** Los Angeles, CA 15,508	27	26,410	$1,191	$268	$57
3	**Nationwide Mutual Ins. Co.*** Columbus, OH 7,367	35	26,045	$2,082	$7	$130
4	**Northwestern Mutual Life*** Milwaukee, WI 8,648	47	25,535	$5,372	$48	$135
5	**Paine Webber Group, Inc.** New York, NY 13,000	48	25,520	$2,512	$42	$190
6	**Kemper Corp.*** Long Grove, IL 16,600	51	25,350	$3,135	$224	$107
7	**Fleet/Norster Financial*** Providence, RI 19,100	89	24,155	$3,051	$336	$104
8	**USF&G Corp.** Baltimore, MD 11,200	118	23,500	$5,582	$232	$127
9	**Firemens Fund Corp.** San Raphael, CA 12,300	124	23,375	$3,704	$247	$147
10	**Continental Insurance Co.*** New York, NY 17,000	126	23,345	$5,878	$1	$160

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Circle Reader Service Number 16

Dow Shakes Up Customer Service with Worldwide Integration Strategy

By William Brandel

Call it the year of the customer. As it repeats its performance as the *Computerworld Premier 100's* top-ranked chemical company, Dow Chemical Co.'s information systems strategy mixes data center consolidation and global systems integration with the goal of shaking up customer service.

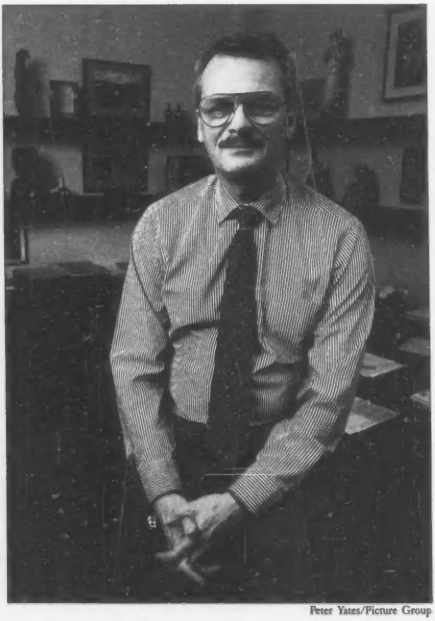
While chemical companies generally spend more on engineering and production systems than on business and administrative applications, global "customer satisfaction systems" are getting the biggest push at Dow.

The company is about to embark on a five-year program aimed at letting salespeople access relevant business information in any Dow database throughout the world.

The initiative is based on a three-pronged effort to simplify order entry, order management and inventory control applications running on IBM mainframes and accessible from desktop computers.

"Our ultimate objective is a high level of integration for our systems," says Hans Huppertz, Dow's vice-president of IS.

"Before, the customer had to talk to two different people to make the order, who would then have to talk to someone in inventory to see if the product was in stock and another in marketing to get a price quote. Now, one salesperson will be able to get the whole picture on one screen," he says.



Peter Yates/Picture Group

Dow's Huppertz *says data center consolidation gives his firm greater control over its global operations and generates immediate cost savings*

With this single-interface approach, combined with a worldwide network based on IBM's Systems Network Architecture and Token-Ring as well as Digital Equipment Corp.'s Decnet, a salesperson anywhere in the world will be able to learn what is available to him from any Dow facility, according to Huppertz.

The information is to be accessed from Apple Computer, Inc. Macintosh machines as well as IBM Personal Computers.

"You can't argue with success," says Huppertz, who has moved the Macintosh to standard status. "At this point, it is obvious that the Macintosh gives the scientific or technical user a lot more ease of use, and there is good productivity to be gained."

INAUGURAL SITE

Dow's Canadian Styrofoam business subsidiary will reportedly be the inaugural site for the integration undertaking, which is slated to begin next year.

Dow's IS strategy runs parallel in many ways to that of Du Pont Co. — its major rival — in Wilmington, Del., which landed in fourth place among chemical companies listed in the



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Circle Reader Service Number 17

Premier 100. Du Pont is in the process of installing a global network and has an international electronic mail system already in place.

In the past year, Dow has also consolidated three U.S. data centers into one and integrated two additional data centers in Brazil. Huppertz says data center consolidation gives his organization greater control over its global operations and generates immediate cost savings.

"We're saving on the cost of software, as each data center has to carry its own software license, and that is a high-priced commodity," he says.

The consolidation increases communications costs as users tap into remote processors via high-speed lines, but the benefits offset those expenses, Huppertz says.

STAFF CONSOLIDATION

Huppertz concedes that data center consolidation has led to personnel cuts. "Because of the hardware and software consolidation, the operators get consolidated as well," he said.

Until last year, Huppertz reported to Dow's vice-president of engineering and served dual roles as corporate liaison and U.S. director of IS operations. In October, he was promoted to vice-president of corporate IS and began reporting to the chief financial officer, reflecting a recognition at Dow of the strategic value of its global information systems.

"You can say I'm the glue that holds it all together," Huppertz says. "I make sure we aren't heading off in five different directions with research and development strategies and standards."

Huppertz, who has initiated a business systems manager council that places IS staffers in Dow business units, likes to hire MBA graduates and teach them technology.

He also encourages them to move up the ladder by seeing the world. With IS support on a global basis as the organization's highest priority, knowledge of Dow businesses and technologies in Canada, Europe, Latin America and Asia is imperative for ambitious managers.

"You can say I'm the glue that holds it all together. I make sure we aren't heading off in five different directions with research and development strategies and standards."

— Hans Huppertz
Dow Chemical

A Dutch emigre who has traveled extensively himself, Huppertz sets the standard by spending more time traveling than in his office. "That's how it should be," he says.

Chuck Gibson, a vice-president at Index Group, Inc., a consulting firm in Cambridge, Mass., confirms the view of Dow's top executives interacting closely with IS in formulating strategy.

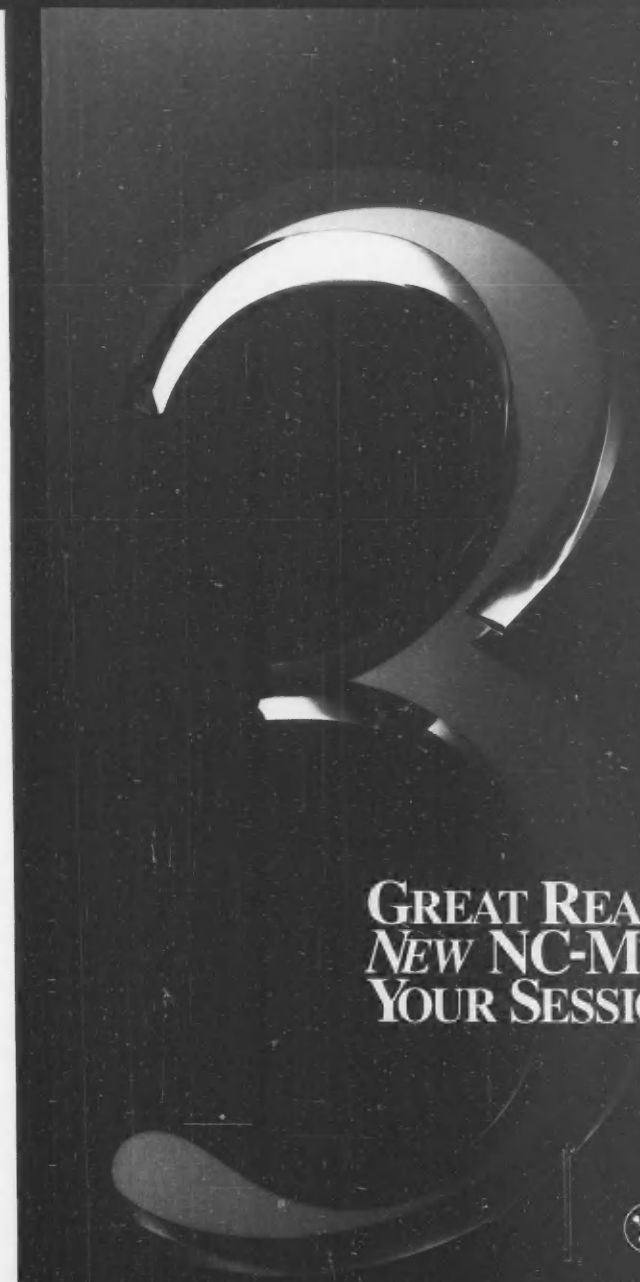
"An IS session is not a one-time classroom experience," he says. "In fact, the top 100 or so managers at Dow all interact with IS on a regular basis, at Huppertz's initiative and with the encouragement of executive management."

BRANDEL IS A FREE-LANCE WRITER BASED IN BOSTON.

Chemicals

COMPANIES ARE RANKED BY INDUSTRY ACCORDING TO CW 100 INDEX.
*ESTIMATES ARE FROM *COMPUTERWORLD* SOURCES, NOT THE COMPANY.

Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**Dow Chemical Co.** Midland, MI 54,300	16	27,225	$16,682	$2,410	$315
2	**Monsanto Co.** St. Louis, MO 47,700	32	26,275	$8,239	$591	$168
3	**Freeport-McMoran, Inc.** New Orleans, LA 6,700	77	24,455	$1,945	$310	$28
4	**Du Pont Co.** Wilmington, DE 140,500	95	23,965	$32,514	$2,190	$1,000
5	**Himont, Inc.*** Wilmington, DE 3,200	105	23,745	$1,746	$375	$25
6	**W.R. Grace & Co.*** New York, NY 42,600	142	23,065	$5,786	$229	$90
7	**American Cyanamid Co.** Wayne, NJ 34,900	159	22,701	$4,592	$306	$106
8	**Sherwin-Williams Co.*** Cleveland, OH 16,300	173	22,311	$1,950	$101	$28
9	**Union Carbide Corp.*** Danbury, CT 43,600	176	22,275	$8,324	$662	$125
10	**Olin Corp.*** Stamford, CT 15,300	181	22,185	$2,308	$98	$34



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Jack Van Antwerp

Timken's *Fisher and Kost run systems operations with an eye toward the distant future*

A Gamble and a Long-Term View Pay Off at Timken

By Michael L. Sullivan-Trainor

Few executives would risk spending $500 million to build a computerized manufacturing facility when business is slowing down. Fewer still would consider such a large investment when the company's total revenue dipped below the billion-dollar mark.

However, the managers at Timken Co. did just that, erecting a world-class steel plant during a period when revenue dropped to $900 million from $1.4 billion. Their gamble was inspired by competition from Japanese companies and by a commitment to long-term success.

The company's willingness to apply technology in key areas of its business led to its top rank among industrial and automotive manufacturers in the *Computerworld Premier 100* and its 17th rank overall. Timken's $35 million IS budget, which is more than 2% of total revenue, reflects management's reliance on automation.

"They are willing to build now for a very distant future," says Ronald Petrie, first vice-president at McDonald & Co., an investment brokerage in Cleveland. "Timken's emphasis on computers and automation stems from their long-term view."

That view is already paying off. The company's automated Faircrest plant, which went on-line in 1986, has drawn business away from its Japanese competitors' backyards: Nissan Motor Co., Mazda Motor Corp. and Mitsubishi Electric Corp. signed deals with the firm last year to buy roller bearings made with the new plant's higher quality steel.

The Faircrest plant is Timken's latest innovation in the manufacture of tapered roller bearings and specialty steel.

The products are used for such purposes as automotive transmissons, aircraft landing gear and oil pipelines. Ford Motor Corp., General Motors Corp., Deere & Co., Caterpillar, Inc. and aerospace firms are among Timken's largest customers.

The quality of the new plant's steel is so high that manufacturers of bearings have also signed on as customers.

Supervised by a vice-president of technology who also oversees product research and development, Peter Kost, director of corporate information systems, and Garry Fisher, general manager of computer-integrated business, run Timken's systems operations.

FROM THE START

Fisher, who now focuses on long-range technology planning, was responsible for both the engineering and IS aspects of Faircrest, which was built from the ground up.

The plant integrates process automation and business systems, with roughly 20 Digital Equipment Corp. VAX and PDP minicomputers and 40 Gould, Inc. programmable controllers running the entire steel-making process.

The systems interchange instructions with one of the company's four IBM mainframes at the main office over a Systems Network Architecture network.

Within the plant, the computers interchange data horizontally between processes and vertically to disseminate schedules and instructions

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across the shop floor. "We have measured improved productivity and cost reductions since the plant began operation," Fisher says. "We are obtaining quality levels that we have never seen before."

Traditionally, steel mills require seven man-hours of work to produce an ingot ton of steel. With computers running the processes, Faircrest produces an ingot using only two man-hours.

Producing better quality steel at a lower price gives Timken an edge over competitors. "It's the equivalent of what the Japanese were doing to the auto industry — giving more car in a fuel-efficient package," Petrie says. "Timken can give customers more bearing in a smaller, cheaper package because of computer-integrated manufacturing."

But the biggest advantage is flexibility. The plant systems control the mixture of materials used in steel production, allowing each product to be designed to a customer's specifications. These mixtures can be changed rapidly, allowing the firm to react quickly to changing market demands.

"Timken also gets a leg up on the competition by being able to improve the designs of products and change packages more quickly," Petrie adds.

On the business side, Timken relies on a global network running IBM's Professional Office System office automation software. Seventy-five percent of the work force uses electronic mail, and nearly all the top executives use workstations. The company's nearly 12,000 personal computers and terminals reflect its commitment to providing broad access to IS capabilities.

In addition, electronic data interchange is an integral part of the company's operations.

"We put a lot of effort into providing electronic data in whatever form the customers want it," Kost says.

GETTING ALONG

Timken's success can also be attributed to its human resources policies, which are reflected in amicable settlements with the steel union to increase efficiency. Like other manufacturers, Timken also wrestles with the traditional division between manufacturing engineers and IS personnel. There are about 400 IS staff members and roughly 400 engineers. Efforts to break down barriers are evident in the implementation of computer-aided software engineering on the IS side and joint plant development projects. Business units also have their own technical liaisons to implement IS projects.

"As a company we have a very collaborative style," Kost says. "When engineers work with IS, both parties learn. At Faircrest, engineering learned a lot more about database and telecommunications, and the IS people learned more about machine-level interactions."

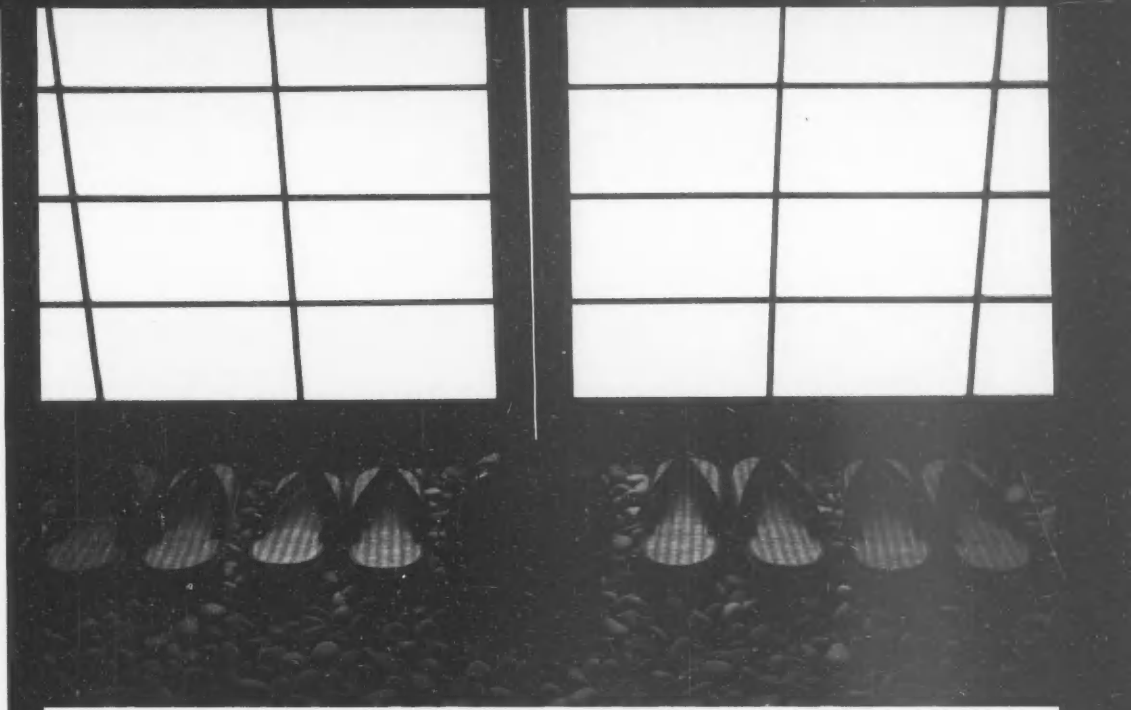
As the managers look to the future, they hope to maintain the right mixture of advanced technology and staff management. "We think one of our keys to future success is to move aggressively in both of these areas," Kost says. "We don't think the companies that are only focusing heavily on technology are going to make it against the Japanese. We have to get the best of the people and ideas and back them with technology."

SULLIVAN-TRAINOR IS *COMPUTERWORLD*'S SENIOR EDITOR, SPECIAL PROJECTS.

Industrial & Automotive Products

COMPANIES ARE RANKED BY INDUSTRY ACCORDING TO CW 100 INDEX.
*ESTIMATES ARE FROM *COMPUTERWORLD* SOURCES, NOT THE COMPANY.

Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**Timken Co.*** Canton, OH 17,400	17	27,120	$1,554	$66	$35
2	**Ingersoll-Rand Co.** Liberty Corner, NJ 29,900	56	25,145	$3,021	$162	$60
3	**Caterpillar, Inc.** East Peoria, IL 58,000	69	24,795	$10,255	$616	$200
4	**Borg-Warner Corp.*** Chicago, IL 70,200	70	24,760	$3,218	$419	$73
5	**Dover Corp.*** Memphis, TN 19,000	72	24,710	$1,954	$146	$44
6	**Black & Decker Corp.** Baltimore, MD 20,300	75	24,590	$2,374	$104	$125
7	**Mack Trucks, Inc.** Allentown, PA 9,400	91	24,135	$2,102	$25	$40
8	**Ford Motor Co.** Dearborn, MI 358,900	167	22,440	$92,446	$5,300	$1,610
9	**Deere & Co.** Moline, IL 38,100	193	21,830	$5,461	$268	$150
10	**Outboard Marine Corp.** Waukegan, IL 12,900	196	21,760	$1,653	$71	$18



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PETROLEUM

Union Texas Buyout Brings Focus on IS Business Value

By Connie Winkler

Four years ago, Union Texas Petroleum Corp.'s IS group was rocked by a leveraged buyout that took it out from under the wing of conglomerate Allied Chemical Corp. and placed it under the intense scrutiny of independent-minded management.

The buyout returned the Houston-based company to its roots as an independent oil and gas producer, changing the IS culture from "trying to do everything for everybody" to focusing systems projects on essential business needs, says MIS Director Richard L. White.

Management's concern about efficient, cost-effective IS operations extends down to the smallest acquisitions. White meets with the top five corporate officers each quarter to evaluate almost every IS decision, including the purchase of each personal computer — a category added to the agenda this year.



Jim Caldwell

MIS Director White *gets to the root of business needs*

Such a tight focus on matching IS projects with business requirements caused Union Texas to rank at the top of the petroleum and mining category in this year's *Computerworld Premier 100*. This new culture has sparked IS applications for day-to-day management and the exploration business itself.

"Union Texas is an aggressive user of highly specialized advanced workstations for simulating underground geology, thus pointing to where oil might likely be found," says Charles M. Strain, a securities analyst at Lovett Mitchell in Houston who has followed Union Texas for the last several years.

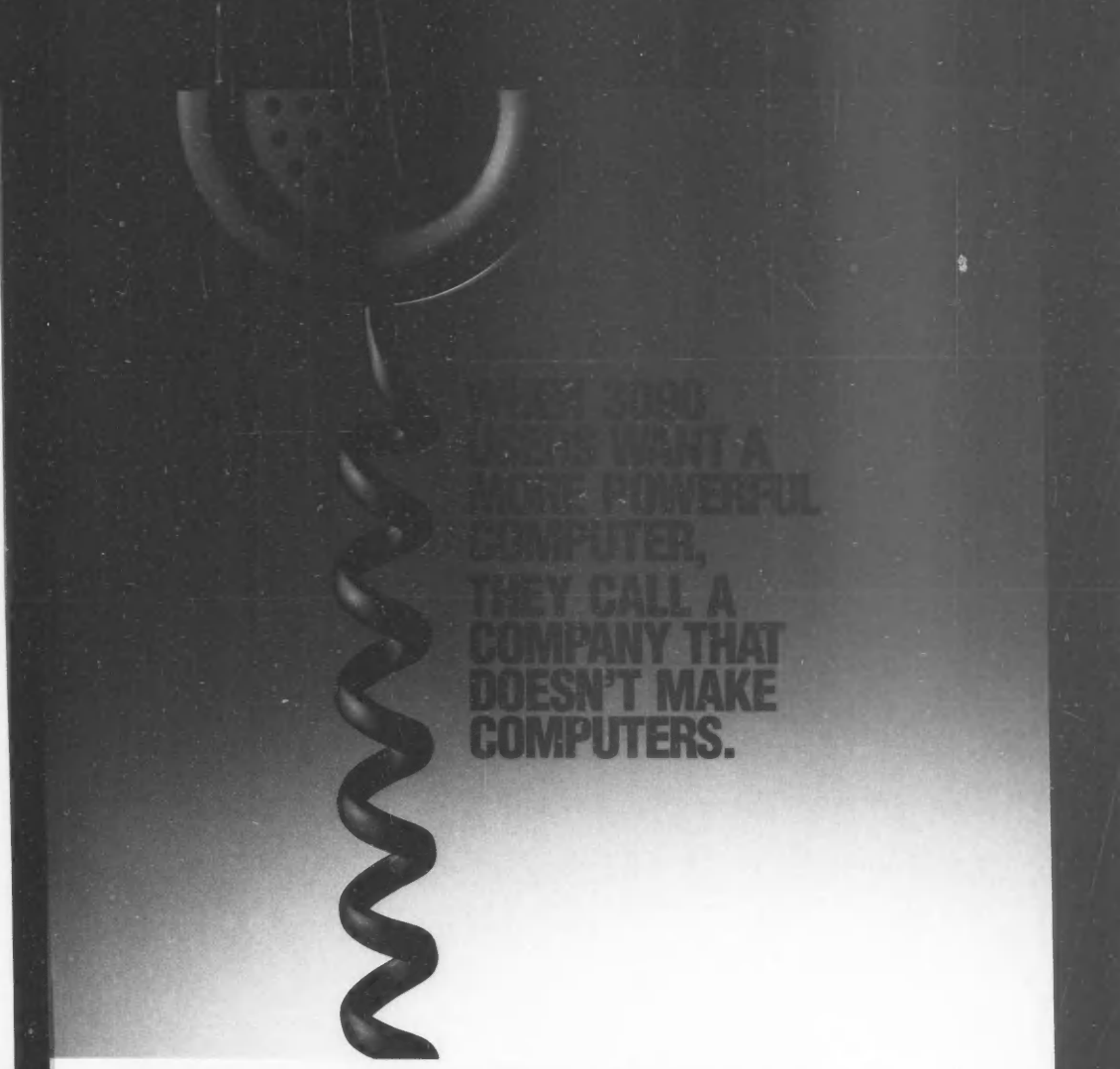
"In my mind, the key to their success has been oil discoveries offshore in the Gulf of Mexico, and those wells are directly tied to the use of workstations for seismic exploration," Strain adds.

Geologists in the company's Houston research groups use workstation-driven applications to identify the location of oil in new wells adjacent to existing ones in the North Sea. Because so-called edge or satellite wells are taxed differently by the UK, they return four to five times the amount of money as a separate new well.

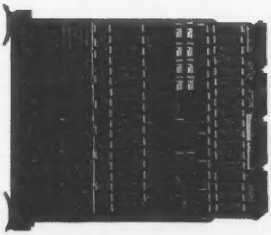
Other significant applications:

- The company installed electronic monitoring devices at well sites, especially in remote parts of the Southwest. Data is downloaded into a handheld computer and then transmitted over phone lines to one of Union Texas' four U.S. regional offices.
- At its Karachi office, Union Texas is using a PC-based system to monitor the company's natural-gas contract with the Pakistan government. Because the new contract is so complex, it could not be managed manually, White says.
- Company lawyers in Houston use an internal electronic mail system based on IBM's Distributed Office Support System to receive daily court transcripts about their cases in foreign countries. One of the most notable cases was an explosion that killed workers at the Piper platform near Aberdeen, Scotland, in the North Sea last year.

Currently, Union Texas is installing a new internal communications network based on IBM's Systems Network Architecture and X.25 protocol. It replaces 10-year-old dial-up



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connections in the regional offices and will also link corporate mainframes to departmental local-area networks, White says.

The company runs an IBM 3090 for business applications and two Digital Equipment Corp. VAXs and one Microvax at the research and development data center, all in Houston. Those processors are connected to about 750 IBM Personal Computers at Houston headquarters and 100 others worldwide.

In addition, the company recently installed IBM's DB2 database management system and its associated Application System (AS), which dramatically improved the ability to query existing systems. White describes bringing in AS and DB2 as rehabilitating existing systems, which added years to their lives.

NECESSARY QUERIES

The query capability was required because at the time of the buyout there was no time or money for new applications development, and management needed a wide variety of financial information. The information was available somewhere in the worldwide organization but not at headquarters, at least not in a timely fashion. A 16-page monthly financial report that senior managers had received was not only late but also did not present information relevant to the new lean-and-mean posture the company was assuming.

"We wanted tighter control over our expenses, and we couldn't close the books fast enough," recalls Robert L. Ryan, vice-president of finance. The newborn company did not have current revenue figures because overseas reporting lagged weeks or months behind. In addition, it had estimated revenue for the former parent company. The estimates were sometimes manually compiled from many different systems and PC spreadsheets.

"We didn't have time to rewrite any systems, so we began looking at [off-the-shelf] facilitating tools," White says. "With the [leveraged buyout], the needs didn't go away — the solutions changed."

Petroleum

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2	**Atlantic Richfield Co.** Los Angeles, CA 26,500	33	26,195	$17,626	$1,583	$257
3	**Unocal Corp.** Los Angeles, CA 18,200	49	25,440	$8,853	$480	$142
4	**Mobil Corp.** New York, NY 68,900	60	25,030	$48,198	$2,087	$670
5	**Amoco Corp.** Chicago, IL 50,100	61	24,990	$22,150	$2,063	$250
6	**American Petrofina, Inc.** Dallas, TX 3,200	144	23,040	$2,635	$133	$20
7	**Shell Oil Co.*** Houston, TX 32,432	153	22,830	$21,070	$1,239	$200
8	**Diamond Shamrock R&M** San Antonio, TX 3,700	158	22,710	$1,804	$54	$6
9	**Chevron Corp.*** Houston, TX 52,700	188	22,025	$25,196	$1,768	$171
10	**Sun Co., Inc.** Wayne, PA 22,000	216	21,195	$8,612	$7	$93

"Union Texas is an aggressive user of highly specialized advanced workstations for simulating underground geology, thus pointing to where oil might likely be found."

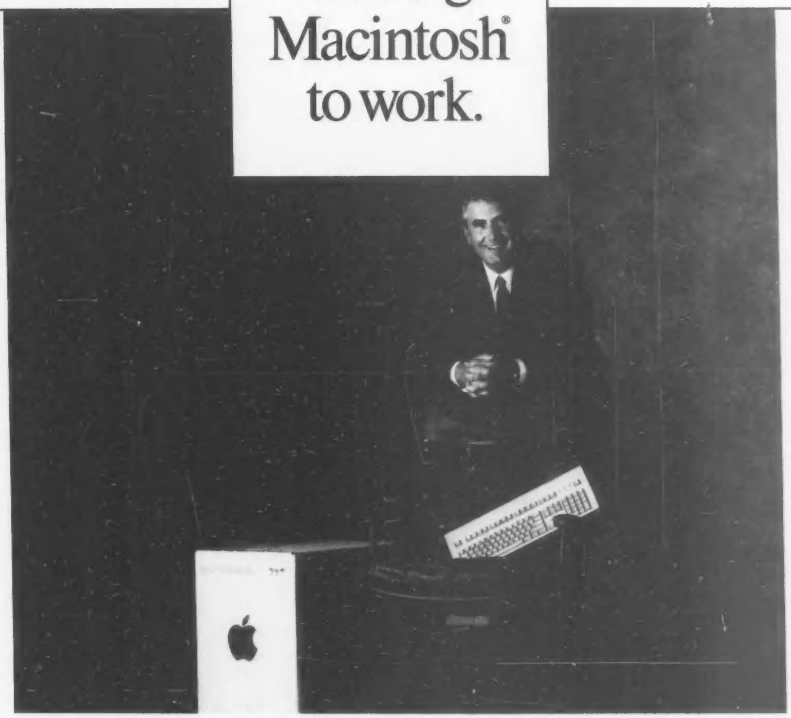
— Charles M. Strain
Lovett Mitchell

A new five- to seven-page financial report was developed using IBM's AS. The report not only succinctly summarized each division's business, but it also flagged key issues and generally guided top management in steering the company away from its leveraged-buyout debt to its current earnings of more than $1 billion annually.

Today, White's information systems staff of 97 focuses on new applications with an eye to business value and timely execution.

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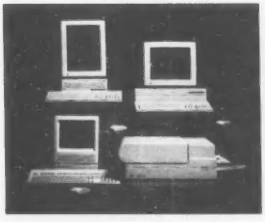


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Circle Reader Service Number 22

Pioneering Efforts Lead Abbott to Top for Second Consecutive Year

By Janet Fiderio

In the highly competitive pharmaceuticals and food industries, it is not easy to top the field in the use of information systems as ranked in the *Computerworld Premier 100*. Accomplishing that feat two years in a row is even more difficult.

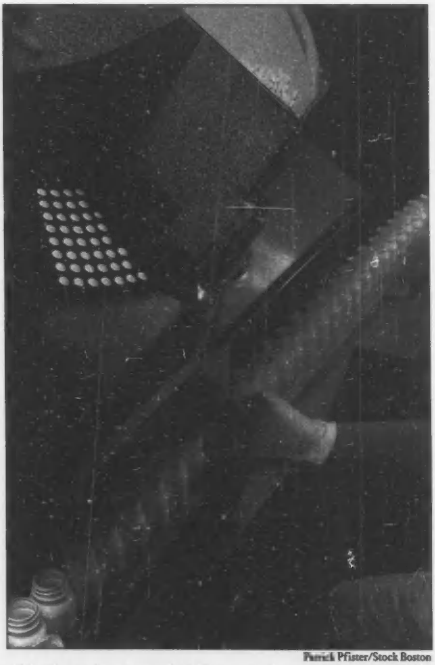
Yet for the second consecutive year, Abbott Laboratories did just that. The company's success in IS is attributable to its commitment to technology in key areas:

- Reducing the time it takes to develop drugs, through computer-assisted molecular design (CAMD).
- Producing documents electronically to meet Food and Drug Administration requirements for new drug approval.
- Automating warehouses to reduce inventory and speed delivery time.

Abbott invests an estimated 2.5% of its annual revenue in IS — expected to grow from $4.9 billion to $5.5 billion this year — to support these efforts.

Because the pharmaceutical industry is so competitive, new technology plays an important role in Abbott's continued economic health. At the helm of the company's IS organization is Vice-President Kenneth Farmer. Farmer, who refused to be interviewed, reportedly manages a complex network of systems estimated to include two IBM 3090s, two 3084s, a raft of Digital Equipment Corp. minicomputers including four VAX clusters and a dozen Microvaxes.

For Abbott and other pharmaceutical firms, developing a new prescription drug is a long, expensive process and one that can benefit from the strategic use of technology. The financial rewards after FDA approval, however, can be very great. For example, according to Juan Noble, an analyst at Argus Research Corp. in New York, Abbott still brings in more than $300 million in sales each year from erythromycin, an antibiotic that dates back to the 1950s. With profits like these, new drugs become the lifeblood of the industry. Pharmaceutical firms have to keep coming up with new drugs to preserve their pricing flexibility, margins and earnings growth.



Patrick Pfister/Stock Boston

IS helps *pharmaceutical firms produce new drugs quickly*

For this reason, the industry is scurrying to reduce the time it takes to develop new drugs. Anything that can be done to reduce that process, says Arthur D. Little, Inc. consultant Larry Chait, is considered an advantage.

Abbott uses CAMD, nuclear magnetic resonance machines and X-ray crystallography to help scientists develop drugs, says Jeff Newton, manager of pharmaceutical communications. This lets chemists address the causes and cures of diseases at a molecular level. Proprietary software and a viewing hood allow scientists to see three-dimensional





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At 3M, NOMAD's reputation for technical excellence is well-known. For the corporate data processing group, NOMAD is the recommended product for end-user computing. And as 3M's billion-dollar business sectors have installed their own mainframes, NOMAD has also been installed. NOMAD is currently used by four different groups within 3M.

All of which underscores the value received from NOMAD technology—and from the ongoing teamwork over the past five years.

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models of molecules on their computer screens, Newton says.

Abbott was one of the pioneers in computer-aided molecular design; today, many pharmaceutical companies use these techniques, according to industry analysts. Such technology, when combined with huge proprietary databases, reduces the vast number of chemicals that otherwise would have to be screened for effectiveness in new drug development. By doing so, the technology accelerates drug research and saves time for pharmaceutical companies.

Pharmaceuticals is a research- and data-intensive business. According to Chait, companies must create and maintain huge volumes of paper for the FDA. "There are literally truckloads of paper that have to be passed to the government," Chait says.

Some of the technologies under scrutiny that could help manage, access and store that information include expert systems and more flexible databases. Another technology getting a lot of attention is image systems using optical disks. Such media have obvious benefits. The 40,000 paper documents now needed by the FDA for a new drug application (NDA) would be accessed much easier via optical disk. Not only is information much more compact, Chait says, but if you build the table of contents and referencing schemes correctly, you can get at information much more quickly.

Although valuable for NDA filing, optical disks may also help firms simplify the task of finding isolated bits of information stored throughout huge distributed networks.

While optical disks were not available 1½ years ago, when Abbott broke new ground by sending an NDA to the FDA for approval in electronic form, Abbott representatives did the next best thing and negotiated the form of the application directly with the FDA. According to Newton, by sending an electronic application on disks, Abbott let the FDA format the data any way it wanted to and find what it was looking for much more easily.

Today, representatives from several pharmaceutical firms work on a standard for electronic NDA filing through the computer-assisted new drug application review (CANDAR). CANDAR is working with the FDA on more efficient filing techniques. Once an Abbott drug is developed and has gone through the NDA approval process, computers are used to speed clinical trials.

In one clinical study for the blood-pressure drug Cartrol, 1,000 doctors recorded their observations of patients using the drug in a laptop computer provided by Abbott. Abbott will receive a disk from each doctor that will be downloaded into corporate IS systems for statistical analysis. Gathering and analyzing data this way avoids the delays and mistakes that come with rekeying.

Once a drug is on the market, the rush to get it delivered and distributed begins. Electronic data interchange (EDI) plays a major role in the way Abbott gets its products to consumers. Abbott's EDI distribution network, called Quicklink, is a microcomputer-based order-entry system that allows end users, usually hospitals or pharmacies, to order supplies with a number of vendors through one Quicklink connection.

FIDERIO IS A FREE-LANCE WRITER BASED IN GILSOM, N.H.

Pharmaceuticals & Food

COMPANIES ARE RANKED BY INDUSTRY ACCORDING TO CW 100 INDEX.
*ESTIMATES ARE FROM *COMPUTERWORLD* SOURCES, NOT THE COMPANY.

Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**Abbott Laboratories*** North Chicago, IL 38,300	22	26,795	$4,937	$752	$125
2	**Sara Lee Corp.** Chicago, IL 89,100	26	26,535	$11,206	$377	$242
3	**Sipco, Inc.*** Hinsdale, IL 5,403	41	25,705	$3,225	$11	$31
4	**RJR Nabisco, Inc.*** Wilkes-Barre, PA 116,881	43	25,636	$16,956	$1,393	$240
5	**Johnson & Johnson*** New Brunswick, NJ 79,800	50	25,395	$9,000	$974	$200
6	**Merck & Co.*** Rahway, NJ 31,600	57	25,125	$5,940	$1,207	$150
7	**Schering-Plough Corp.*** Memphis, TN 22,100	88	24,180	$2,969	$390	$36
8	**Pfizer, Inc.** New York, NY 40,800	103	23,786	$5,385	$791	$125
9	**Smithkline Beecham*** Philadelphia, PA 38,900	122	23,405	$4,749	$229	$175
10	**The Coca-Cola Co.*** Atlanta, GA 18,100	136	23,175	$8,338	$1,045	$100

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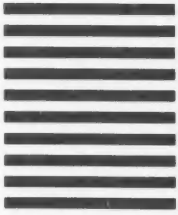
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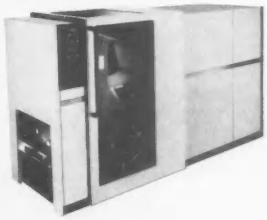
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Circle Reader Service Number 24

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Dun & Bradstreet Creates Advantage from Data Diversity

By Janet Mason

With 26 divisions running their own show, it's not surprising that Michael Field, Dun & Bradstreet Corp.'s top information systems executive and the man charged with getting them to work together, spends little time in his own office.

Field can be found at D&B's Wilton, Conn., location, its New York headquarters or one of the divisions, trying to bring technology advantages used in one area to bear on the needs of another.

"The challenge is to leverage the technology without interfering too much with the autonomy of the business divisions," Field says.

This delicate technology transfer is at the heart of Dun & Bradstreet's success in areas such as worldwide credit information services, including its Advanced Office System, which is distributed through an international packet-switched network called Dunsnet.

With products such as the credit rating service and the A. C. Nielsen Co. television viewing data, Dun & Bradstreet's IS support is applied directly to product delivery. About 90% of the company's IS expenditures, which total $200 million annually, finance development and maintenance of the information services that are sold to other companies.

D&B's effective use of technology ranks it at the top of the diversified services industry in this year's *Computerworld Premier 100*. The company has grown significantly since it began applying technology to its information services in the mid-1970s, expanding and broadening them and making them more flexible, says Ken Noble, a media analyst at securities firm Paine Webber, Inc. in New York.

"D&B's early reasons for computerizing were to reduce costs, increase efficiency and improve the quality of their information," Noble says.

Now that basic automation goals have been reached, Field is pursuing further technology transfer. A potential target is Worldview, a financial information service accessible with PCs via Dunsgate, an internal networking architecture whose technology might be transferred to marketing services, Field says.



Andy Freeberg

D&B's Field *uses technology to leverage the information services that his company provides*

Worldview lets users compare and analyze financial information in spreadsheet format from U.S. and European databases using graphs and charts, a concept that originated with Dun & Bradstreet's advanced development group.

THE GOOD HOST

In addition to meeting regularly with IS executives and senior managers of individual business units, Field hosts an annual meeting for about 75 such employees. He holds some clout in such sessions because he reports to the corporation's president; however, he says, he prefers to pursue a laissez-faire policy when practical rather than "play policeman."

D&B's nontechnical senior managers know more about technology than their counterparts

at most other companies, Field contends, but in an industry where information is the lifeblood, they need to know more.

To teach the managers and raise their technological awareness, Field began a program in the past year in conjunction with human resources managers.

"Every two or three years, there are radically different investment options in technology," Field says. "We're holding this new training so that management can ask smarter questions about investment decisions."

At the sessions, information systems managers and senior managers from the divisions discuss the uses of technology.

"We found out that they haven't discussed things that we thought they would have brought up already because they considered it to be someone else's specialty," Field says.

Eventually, Field intends to extend the sessions to middle-level managers. "The business is more dependent on technology than ever," he says. "Now everyone needs to be involved." The more they do, he says, the more fruitful the efforts to leverage technology across business units.

As D&B continues to develop additional services, new technologies — especially PCs — are letting the company further customize information services, as with Worldview.

"There is now a greater opportunity to format the information in different ways and customize it to various segments of the market," Field says.

Dun & Bradstreet's ownership of Nielsen's marketing and media research division is prompting the company to emphasize the field of single-source marketing, Noble says.

"We have the challenge of changing a great deal of data into concise information products. We have to give the brand managers a composite view of what people are buying and reduce the amount of information so it is not overwhelming."

— Michael Field
Dun & Bradstreet

These services are aimed at providing marketing managers with all the information tools they need to compete in the marketplace, such as data on television viewership, supermarket product movement, use of coupons and direct-mail demographics. "We have the challenge of changing a great deal of data into concise information products," Field says. "We have to give the brand managers a composite view of what people are buying and reduce the amount of information so it is not overwhelming."

Field says that he expects these services to become highly customized in the future. Someday, he says, customers will be able to combine their own internal databases with D&B's information services.

MASON IS A PHILADELPHIA-BASED FREE-LANCE JOURNALIST.

Diversified Services

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Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**Dun & Bradstreet Corp.** Berkeley Heights, NJ 65,500	44	25,635	$4,267	$499	$200
2	**Capital Cities/ABC, Inc.*** New York, NY 19,900	115	23,510	$4,773	$387	$60
3	**CBS, Inc.** New York, NY 7,500	117	23,505	$2,778	$1,153	$36
4	**The Walt Disney Co.** Burbank, CA 35,000	131	23,265	$3,747	$570	$80
5	**Hospital Corp. of America*** Nashville, TN 63,000	172	22,320	$4,111	$259	$70
6	**Alco Standard Corp.*** Valley Forge, PA 16,200	186	22,080	$3,871	$166	$87
7	**Sysco Corp.** Houston, TX 12,500	203	21,490	$5,561	$97	$41
8	**American Medical Int'l, Inc.** Los Angeles, CA 49,000	213	21,215	$3,017	$77	$67
9	**Waste Management, Inc.** Oakbrook, IL 33,700	251	20,185	$3,566	$464	$34
10	**ARA Holding Co.*** Philadelphia, PA 120,000	254	20,150	$3,917	$5	$88

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Circle Reader Service Number 25

RETAILING

J. C. Penney Pursues the Ultimate System with Creative Applications

By Philip J. Gill

For more than 50 years, retailers have been chasing a single elusive goal — putting the right merchandise in the right place at the right time.

J. C. Penney Co. is no different from its competitors in pursuing this "ultimate system." But Penney's creativity in using information systems to reach this goal separates the company from its peers.

For example, Penney is working on a multimedia information system that will transmit images of products to customers across a satellite television network.

Customers will be able to use this electronic, interactive catalog to view images and hear an audio presentation at their local stores using personal computer workstations. Development work is currently being done on IBM Personal System/2s equipped with Micro Channel Architecture technology.

PATHWAY TO THE TOP

Such innovation, combined with the ability to accomplish the standard applications well, once again places Penney at the top of the retailing industry in the *Computerworld Premier 100*. "Information systems are increasingly important to the competitive posture of retailers," says Dave Evans, Penney's vice-president of systems and data processing.

"We can all get the same merchandise and be in the same malls. Even an information system in and of itself is not a competitive weapon — it's what you do with the information once you get it," he says.

In pursuit of the elusive ultimate system, J. C. Penney is continuing to extend its IS support in the following areas:

- The company is aggressively adding suppliers to its electronic data interchange (EDI) system, which is shifting from a proprietary to a standard environment.
- Penney is using bar-code tags on merchandise for automated data input to its IBM Systems Network Architecture (SNA) network for better inventory tracking and control.
- The retailer is implementing new management applications for sales and trends analysis using the bar-code data.
- It is installing image processing applications, including multimedia technology, and expanding the use of its private, satellite-based television network.
- Penney continues to use new application development tools, technologies and methodologies within its systems development.

Penney, which moved its headquarters from New York to Dallas last year, is switching its proprietary EDI format to the ANSI X12 standard. Before converting to the standard, the company could exchange data only with its largest suppliers — the ones that possessed sufficient resources to develop systems that could interface with the proprietary system.

Currently, Evans says, Penney exchanges information using EDI with about 500 suppliers, compared with 200 suppliers last year. Of those, 300 have already pledged to develop EDI interfaces based on the ANSI standard.

Standardizing will also allow improvements in the EDI system. With



Stan Wolenski

J. C. Penney's Evans *uses information aggressively as a strategic weapon*

"Computerworld Response Card Decks really opened doors to the 'heavy-hitter' accounts..."

Spectrum Concepts, Inc. is a 10-year-old software developer based in New York City. The company, which provides software and services to large corporations and financial institutions, recently developed XCOM 6.2, an LU 6.2-based software product that dramatically improves file transfer between different computing environments.

XCOM 6.2 eliminates the need for extensive custom programming when transferring data from one computer to another, including PCs, mainframes and minis. And it significantly lessens the amount of time necessary to complete connectivity projects.

Company president Alec Gindis was impressed with industry reaction after a news story announcing XCOM 6.2 appeared in *Computerworld*. So when Spectrum began implementing its marketing strategy for the new product, he considered *Computerworld* a key resource.

"Our goal was to generate sales leads from major organizations — Fortune 500 and Fortune 1000-type companies — that need to transfer files. We decided to use response card decks, and, based on the reaction we got to that product announcement, Computerworld's *was the card deck we thought of first.*



— Alec Gindis
President
Spectrum Concepts, Inc.

"And it's paid off; the results have been terrific. We've received hundreds of high-quality leads so far, and they're still coming in. In fact, Computerworld *Response Card Decks really opened doors to the 'heavy-hitter' accounts — major organizations that learned about us through the cards.*

"Now we've gotten to where we are recruiting additional account executives to follow up on the volume of these leads. Computerworld *Response Card Decks give us the best cost per lead of any medium. They also let us refine our marketing strategies through scientific 'split testing' — something other card decks don't always offer. We consider that a valuable bonus."*

Computerworld Response Card Decks give you a cost-effective way to reach a powerful buying audience of over 127,000 computer professionals. They're working for Spectrum Concepts, Inc. — and they can work for you. Call Norma Tamburrino, Account Manager, *Computerworld* Response Card Decks, at (201) 967-1350 to reserve your space today.

COMPUTERWORLD
RESPONSE CARD DECKS

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the proprietary system, Penney could send and receive only summary information of each invoice, usually showing the total amount due. Using the ANSI standard is more flexible; it enables more suppliers to have line-by-line invoice descriptions. This will result in greater accuracy in inventory, Evans says.

YOUR ORDER IS READY

The EDI strategy also includes providing an on-line order status inquiry capability. "We can ask the system if an order shipped on June 12, and it will tell us it did or it didn't and supply us with a new date," Evans says.

Penney's SNA network is one of the largest in the U.S., supporting more than 100,000 terminals, including point-of-sale (POS) systems. Currently, the company is installing bar-code tags on all its merchandise. These tags will be read by optical character recognition (OCR) readers installed on every POS terminal and cash register in the firm's 1,400 stores.

A successful pilot program with Levi Strauss & Co. is moving ahead to a wholesale conversion of all merchandise.

"The bar code provides a faster transaction for our customers," Evans says.

Collecting the information, however, is just the first step. Then, using sales information that is fed into the network through bar-code tags and OCR readers, Penney's buyers and managers can work on several application systems that assist them in honing their merchandising strategy.

WERE SALES GOALS MET?

"Users will be able to pull information up on any terminal on the network," Evans says. For instance, buyers will be able to match real sales of a particular item by stock-keeping unit number against the sales plan for that particular item, to see whether it needs to be reordered and when.

Retailing

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Industry rank	Company Location Total employees	Premier 100 rank	Total score	Total revenue (millions)	1988 profits (millions)	Estimated IS budget (millions)
1	**J.C. Penney Co.** Dallas, TX 185,500	55	25,155	$15,296	$807	$220
2	**Great Atlantic & Pacific Tea Co.*** Montvale, NJ 82,300	116	23,506	$10,068	$128	$101
3	**Sears, Roebuck & Co.** Chicago, IL 510,500	121	23,430	$50,251	$910	$775
4	**Federated Department Stores*** Norcross, GA 63,700	130	23,270	$4,542	$159	$200
5	**F.W. Woolworth Co.*** New York, NY 128,500	133	23,221	$8,088	$288	$81
6	**Melville Corp.*** Harrison, NY 93,500	147	22,965	$6,780	$355	$68
7	**Carter Hawley Hale Stores, Inc.*** Anaheim, CA 35,000	148	22,910	$2,708	$6	$40
8	**Winn-Dixie Stores, Inc.*** Ft. Lauderdale, FL 81,900	190	22,005	$9,088	$128	$91
9	**The May Department Stores Co.*** St. Louis, MO 147,500	214	21,210	$11,742	$534	$100
10	**K Mart Corp.** Troy, MI 342,500	215	21,200	$27,550	$803	$130

With the proprietary system, Penney could send and receive only summary information of each invoice, usually showing the total amount due. Using the ANSI standard is more flexible; it enables more suppliers to have line-by-line invoice descriptions.

The company's headquarters campus — where the new image application is being developed — is equipped with a 4M bit/sec. IBM Token-Ring network. This network, Evans explains, provides more than enough bandwidth to support image transmissions.

Within IS, Penney is also seeking to implement new tools, new technologies and new procedures that can be used to improve programmer productivity and shorten application development time. Chief among these new tools are intelligent workstations and relational database management systems.

GILL IS A SAN MATEO, CALIF.-BASED FREE-LANCE WRITER.



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3	23	43	63	83	103	123	143	163	183
4	24	44	64	84	104	124	144	164	184
5	25	45	65	85	105	125	145	165	185
6	26	46	66	86	106	126	146	166	186
7	27	47	67	87	107	127	147	167	187
8	28	48	68	88	108	128	148	168	188
9	29	49	69	89	109	129	149	169	189
10	30	50	70	90	110	130	150	170	190
11	31	51	71	91	111	131	151	171	191
12	32	52	72	92	112	132	152	172	192
13	33	53	73	93	113	133	153	173	193
14	34	54	74	94	114	134	154	174	194
15	35	55	75	95	115	135	155	175	195
16	36	56	76	96	116	136	156	176	196
17	37	57	77	97	117	137	157	177	197
18	38	58	78	98	118	138	158	178	198
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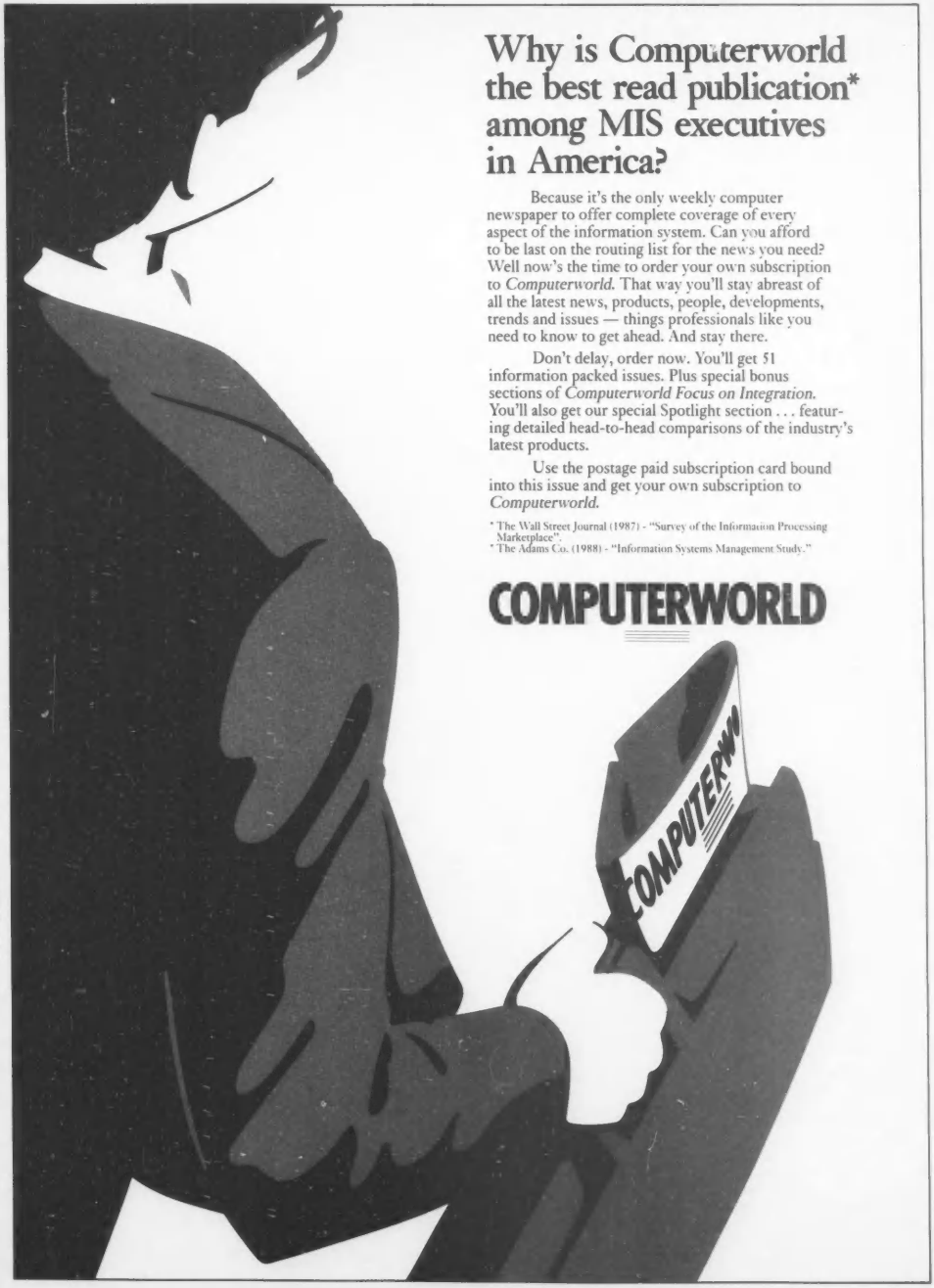
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11	31	51	71	91	111	131	151	171	191
12	32	52	72	92	112	132	152	172	192
13	33	53	73	93	113	133	153	173	193
14	34	54	74	94	114	134	154	174	194
15	35	55	75	95	115	135	155	175	195
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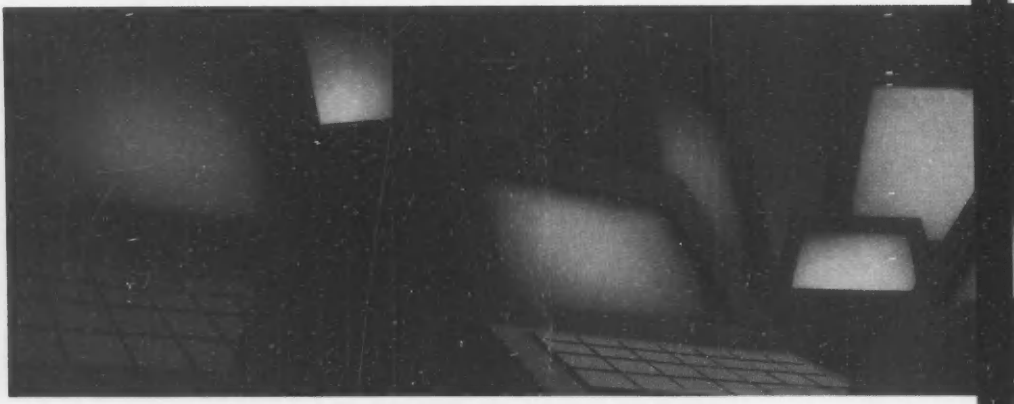
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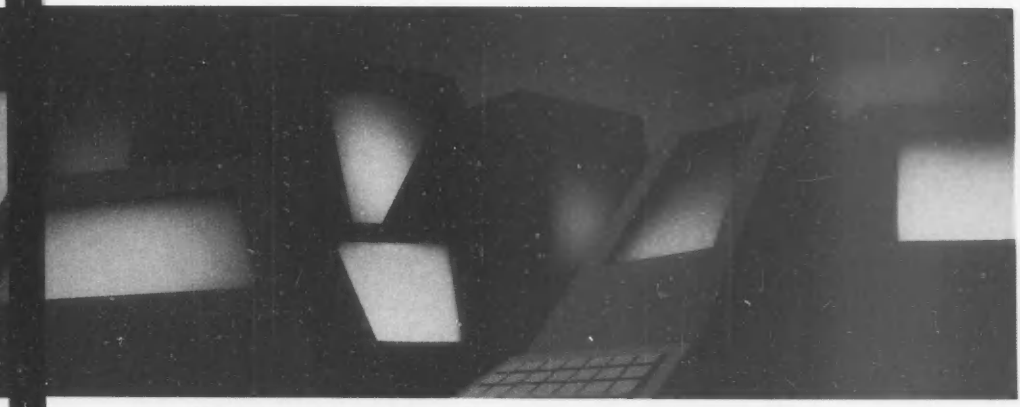
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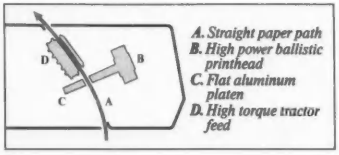
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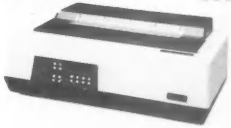
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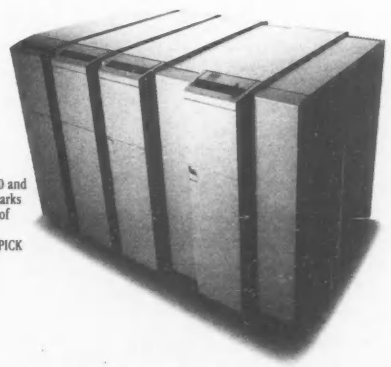
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